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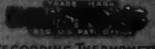
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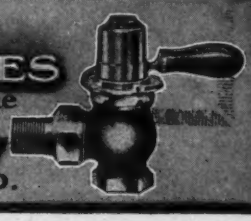

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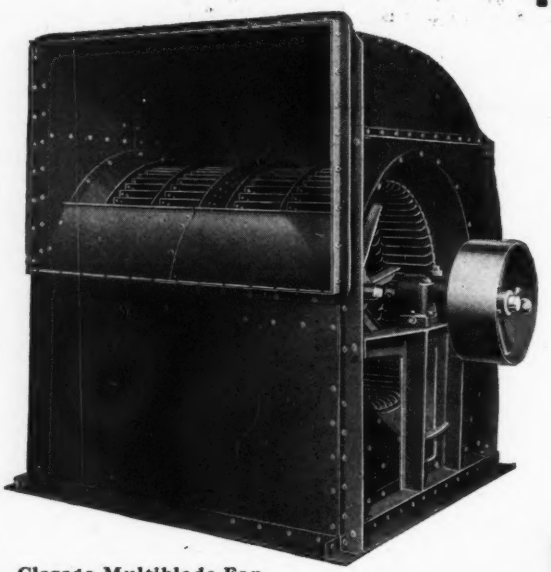

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THE HEATING AND VENTILATING MAGAZINE

Cooperstown, N. Y. JULY, 1918 1123 Broadway, New York

Reasons for Failures of Heating Systems

BY J. D. HOFFMAN

(From a Paper Presented at the Summer Meeting of the American Society of Heating and Ventilating Engineers, in Buffalo, N. Y., June 26-28, 1918.

The time has come for a campaign of education for more satisfactory heating and ventilation in the homes of our country. Buildings of larger proportions have been carefully worked out, because of their importance as public utilities, have been treated with such respect by both architect and engineer as to insure fairly satisfactory service. The home of the private citizen of moderate means, on the contrary, still suffers greviously and the need for such agitation is apparent. The society should do this and some means should be found through which to educate the public to demand and see that they get more satisfactory heat in their homes.

POOR BUILDING CONSTRUCTION

The recent coal situation has served the purpose of calling to the attention of heating and ventilating engineers that in the future the economic problems of the home must necessarily become more vital factors. Heretofore they have pacifically endeavored to fit their heating and ventilating systems into ill-conceived and poorly constructed houses and have trusted to their ability as engineers to overcome the handicap imposed upon the systems by architects or constructors who knew little and cared less about the requirements of home comfort. The heating and ventilating engineers this past winter have shown their willingness to do anything in their power to tide over the acute stages of panic and suffering due to the fuel shortage. They have unceasingly conseled "fewer fires" and "more economic firing," because under the conditions this was all that could be done. Then, nothing counted as much as direct coal saving but now that the stress of severe winter has passed, we may ask ourselves: What and how may the heating and ventilating engineers do to assist in laying the foundation of a more effective economy in the years just ahead?

I have especially in mind some of those conditions (principally residential) that not only work against economic heating, but absolutely prevent it in a large number of cases. Some of these conditions are due to the mistakes of the architect with knowledge afore-thought or otherwise, some of them to those of the heating man (or hardware man) who installs the sys-

tem, and some to those of the householder who practising false economy is not willing to pay the price of good work.

CAMPAIGN NEEDED FOR BETTER BUILT HOUSES

We need to urge a campaign for better built houses—houses that are made to *live in* and not merely to rent or to *sell.* It is a sad commentary on our American domiciles, but it is a fact that the average residence is a satisfactory habitation for only nine months in the year. It has been stated that in 1912, 75% of the residences built in the United States cost each $5,000 or less. This ratio, if correct, has probably not changed much in the interim. From what I know of the methods of construction of the average residences of this class, I am safe in venturing that 75% of this number are not satisfactorily heated. Further, I am wiling to venture that 75% of the number not giving satisfaction are failing, not so much from the lack of gray matter on the part of the heating man, as from unsatisfactory house design and construction.

In most of the ordinary balloon-framed houses the sheathing is very inferior in grade and loosely butted at the edges, when there should be solid boards and lap joints., Some of the houses have no building paper or its equivalent, some have one course of the building paper and a few have two, but very few courses are laid with care to serve as an insulation. Two courses of paper in face contact are, it should be stated, inferior to one course with the sheathing and one course woven in and out over the studding; or, to one course with the sheathing and one course on the inside of the studding, with strippings under the laths to bring the plaster free from the paper surface. Again, suppose the wall is well protected against inleakage but the upper and lower ends of the spaces between the studs are open; in this case there is free convection of air upwards between the inner and outer layers of the wall and the heat that should be kept within the room is dissipated to this air current and lost to the attic, and the conditions are worse than the open wall in that the heat is lost and there is no corresponding physical benefit from inleakage.

TYPICAL CASES OF POOR BUNGALOW CONSTRUCTION

One of the worst types of construction, and one I have frequently met with, is the bungalow type second floor outer wall which offsets within the plane of the first floor outer wall. Irrespective of the type and quality of main wall construction (balloon-frame, brick or stone), the second floor wall is studded down from a ceiling level near the roof line, lathed and plastered on the inside of the studs and on the ceiling; and the outside of the studs and joists left open to the cold spaces under the roof. In two, otherwise well-designed and properly-heated stone bungalows called to my attention recently, where the heating systems were pronounced failures, the heat lost through the second floor walls and ceilings to the cold spaces underneath the roof was so great that a cold draft of air down the open stair was sufficient to make the first floor uncomfortably cold. A careful inspection of the heating systems showed them sufficient in capacity to supply similar buildings with ordinarily well constructed walls, and excessive in capacity for the heavy stone outside walls those houses had.

Everything seemed to be satisfactory but as a last resort I asked to see the attic construction. Here we found that the exterior walls and ceiling of the second floor had only one ordinary lath and plaster thickness separating the rooms from the attic

spaces. The outside temperatures at the time were near zero and the temperature in the attic spaces showed that the heat was going through these plaster partitions like water through a sieve. My advice in each case was to surface the outside of the studs and joists with heavy building paper or tight boards, or better, with both. I have mentioned these two cases because they show how a splendid construction may be set at naught by inexcusable carelessness in some hidden detail of construction. These houses that on the face of things were overheated, were as a matter of fact only partially heated and through no fault of the heating man excepting that he should have insisted upon knowing what kind of construction would be used in these various walls. Most cases of poor house construction that come to the attention of the heating and ventilating engineer differ, however, from the ones mentioned in that the failures are due to *general house debility* and it is more difficult to say which bad feature has the greatest effect to produce failure of the heating system.

POOR PRACTICE TO CARRY PIPES THROUGH ATTIC

It frequently happens that in order to conceal the piping the heating engineer frequently crosses the wall and carries his pipes through the attic spaces. The practice improves the appearance of the room somewhat (and some householders insist upon it), but it is opposed to economy. In one striking example of how not to do it, a new vapor system was installed in a stone bungalow last summer with all the second floor returns and some of the mains traversing these attic spaces. The result was a freeze-up in every radiator on the windward side, alternating of course as the wind shifted so as to give every room some of the same experiences, and during one week of the extreme weather last winter every second floor radiator was out of commission. No insulation was put on the pipes and I doubt if they could have been successfully insulated against the zero temperatures which were indicated by the thermometer near the pipes. Vapor system returns are especially susceptible to freezing conditions.

OVERHANGING ROOMS SHOULD HAVE WELL-INSULATED FLOORS

Another feature of house design that is frequently fatal to the plans of the heating engineer is the overhanging room with only one thickness of ⅞ inch flooring on the room and light ceiling over the porch. This always gives a cold floor that is not only uncomfortable to the occupants, but eliminates heating possibilities on cold days. These remarks do not apply of course to sleeping porches with no heat. If an overhanging room is desired, be sure to provide for a well-insulated floor.

LOOSE CONSTRUCTION AROUND WINDOWS

One feature of house construction that reflects against the builder rather than the architect is the loose construction around the windows. The owner wishes free moving sash and the workmen give him everything he could desire in this regard. But how about the person who is expected to inhabit the room on a zero day when the wind is blowing a 20 mile velocity? I have caught snow in my hand at a distance of 2 ft. from a tightly-locked window, in a house supposed to have better than ordinary construction. What can the society do to better such conditions? Window strips, metal weather strips, and storm windows may be urged. Storm windows, top hung, give satisfactory insulation during the cold days and at the same time provide ventilating possibilities

on moderate days. An average nine-room house can be supplied with good storm windows, west, north and east for an expenditure of from $75 to $100 and the coal saving will pay for the first cost in two years time. Such storm windows are no hindrance to open-window ventilation when desired.

OUTSIDE CHIMNEYS NOT GOOD DRAFT PRODUCERS

Next, let us look at the chimney. Several points in common practice among architects tend toward inefficiency. The outside chimney, in spite of its possibilities toward exterior ornamentation, is not a good draft producer because of the chilling effect of the outside air. Where a chimney is required in an outside wall it should be not less than two bricks thick (8 in.) on each side of the flue at the thinnest part, increasing to at least 12 in. on the lowest part. This is improved if the chimney wall is double with an air space between the walls. Such an air space may be closed in with an occasional layer of header bricks from the outside wall nearly touching the thinner wall. These header bricks cut off air circulation and in addition steady the inner wall. They must not bind the walls together since the lineal expansion of the two shafts are not equal. The chimney is improved occasionally by an ornamental wall of cobble stones laid up on the outside of the chimney proper. All chimneys should have an inner lining of hard burned tiles well cemented at the joints and embedded with the inner brick surfaces.

Let me add a word of caution in regard to the inside chimney: *Under no consideration should the house construction be rigidly fixed to the chimney.* This is too frequently done. The expansion and contraction of the chimney causes movement of the floors, thus cracking the walls and ruining the fits of the doors, casings, etc.

SPACE RESTRICTIONS IN WARM-AIR FURNACE HEATING

So far I have been pleading for better *exterior construction* since this is the most vital. The points touched upon do not by any manner of means exhaust that part of the subject, but now notice what the heating man encounters in the *interior construction*, with indirect heating, or say *furnace heating.* (Steam and hot water direct heating may, of course, be fitted to almost any building no matter what the interior construction may be.) Of the unsatisfactory furnace systems, I wager that 75% fail because the architect and constructor have restricted the heating man to such a degree that the heat lines of his system are too small to carry the heat necessary to supply the loss through the outside walls and windows. If this statement is even only approximately true, then it would seem that our society has neglected the furnace heating business. Any one of the necessities of the home that is so vital to so many of our people should be more carefully guarded.

To note some of these limitations, taking them in the order of first importance, the *wall stack* is, in my opinion, the chief offender. In houses of this classification ($5,000 or less), the interior walls are built of 4 in. studding, set 16 in. on centers. This gives, allowing for shrinkage of the studs, approximately 3¾ by 14¼ in. maximum cross section of opening through which the vertical air ducts (stacks) are run. Since stacks fit loosely in this space and are supposed to be insulated from the wood work of the wall by one or two layers of asbestos paper, single walled stacks will be about 3⅝ by 14 in. and double walled stacks (two stacks fastened symmetrically with each other with a thin air space between), 3¼ by 13⅝ in. All such stacks are of tin or light galvanized iron, and as such

cause very little friction in the movement of air through them, but they fail because they are *too thin* or because they have *too many right-angled turns.* The maximum wall stack has say 45 sq. in. net cross sectional area. This will supply a 10x12 ft. centrally located room having small exposure, but is not sufficient for large rooms or for heavily exposed rooms.

Can't we conceive of some new styles of first floor designs that will permit square, or nearly square, air shafts instead of the elongated rectangle whose effective cross area approaches zero?

Another point, chargeable principally to the owner, is the low basement ceiling that reduces the pitch of the leaders to a minimum. If the average householder realized the importance of extra pitch to the pipes in the basement; he would let loose of enough additional capital to guarantee a ceiling height of 8 ft. instead of 6 ft. as is so often found.

Another point, tabooed by the average furnace man as unnecessary, is the return metal duct. No furnace plant should be installed that has any part of its air lines formed by merely tinning along the edges of the studs and joists. This is against the laws of the convection of air and is an offense against the sanitation of the building. The almost universal custom among furnace men is to take air from off the floor of the room, together with dust and all, and carry it back to the basement through a duct that has one side of very rough plaster, two ends of rough studs and one side of tin. In many cases this is continued to the furnace between rough joists on two sides, a fairly loose floor above and tin beneath. After a while the collection of dusts and micro-organisms that deposit on these rough surfaces would fill a cemetery if turned loose en masse on the neighborhood. Why not add a few dollars to the building and make a smooth duct system with hand holes at intervals to permit cleaning once each year by swabs or fans as the case may require. Not only will the house be more sanitary but the heating system will come nearer giving satisfaction because the laws of friction have been considered intelligently. Teach the householders what to expect and most of them follow your advice.

The conditions governing the pitch of the pipes, aggravating as they may be, are to a greater or less degree within the control of the heating man. Friction, on the other hand, is a worse enemy to overcome because the conditions controlling it are bound up with the house wall construction and this is usually fixed by the architect before the problem is put up to the heating man. I have no desire to shift the burden of responsibility. The mediocre heating man, especially the furnace man who knows enough to buy a furnace at the cheapest price but does not know enough to install it correctly, is a detriment to the heating profession, but in many cases he is more sinned against, than a sinner. He is the victim of a type of construction that even the best at times stumble over. What we need in this country is a type of building construction that looks toward comfort, utility and permanency.

AVERAGE HOME BUILDER SHOULD BE INFORMED OF STRUCTURAL REQUIREMENTS.

Is it not possible to develop a campaign of education in such a way that the average man who may be contemplating building himself a little home may become more informed on these vital points that are so necessary in coordinating the heating and ventilating features with the building construction, and in that way develop an independent thinker who will not be wholly at the mercy of the unscrupulous promoter or the uninformed individual who frequently

poses as an architect or engineer? Such a movement to be effective must be supported by some organization of men whose interest in the best things under discussion can not be questioned. The press of the country is always ready to assist in anything that stands for the public good so long as it is convinced that the movement is bona fide and under competent supervision. May the time soon come when we will build our houses to serve as homes and not as private cantonments.

CHICAGO COMMISSION ON VENTILATION

Determining the Heat Given Off by Engines and Power Piping

By Dr. E. V. HILL,
Chief, Division of Ventilation of the Chicago Health Department
and
W. J. MAUER,
Engineer, Chicago Commission on Ventilation.

Some time ago the Engineering Department of the City of Chicago requested the Ventilation Division of the Health Department to conduct tests with the view of determining the amount of heat supplied to the engine room of pumping stations by the engines and power piping in the building. In stations formerly erected the amount of radiation that should be omitted, due to the heat supplied by the engines and accessories, and absorbed by the cold water mains, etc., was largely a matter of guess work, as no accurate data on this subject were available.

The problem at hand was the new Mayfair pumping station, then under construction. This station was to have seven Reidler-type triple-expansion engines, three with a capacity of 17,500,000 gal. each, at 140-ft. head, and four with a capacity of 25,000,000 gal. each, at a 25-ft. head, operating at 185 lbs. steam pressure. To secure the necessary information as to the heat that would be supplied by these engines we decided to make a test in the Lake View pumping station, which has a similar equipment, except that there are only four engines of the Mayfair type, with a capacity of 25,000,000 gal. each in the Lake View station. Besides these engines the accessory equipment, such as condensers, air-pumps, steam lines,

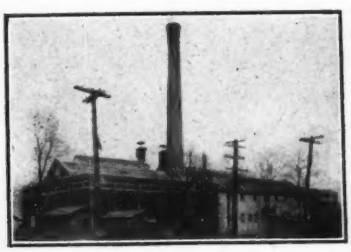

Fig. 1—Looking North.

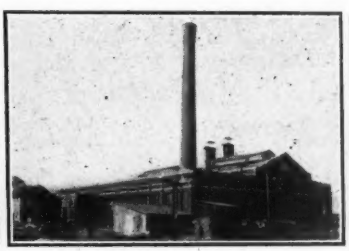

Fig. 2—Looking Northwest.

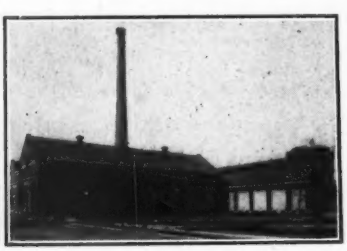

Fig. 3—Side View of Engine Room, Looking West, in which Test was Made.

LAKE VIEW PUMPING STATION.

etc., must, of course, be taken into consideration.

It is evident that in order to determine the net heat supplied by this equipment we must determine the air change in the building under average winter conditions. We must also know the heat loss from the building, due to temperature differences on inside and outside of engine-room walls. The following method, therefore, was adopted:

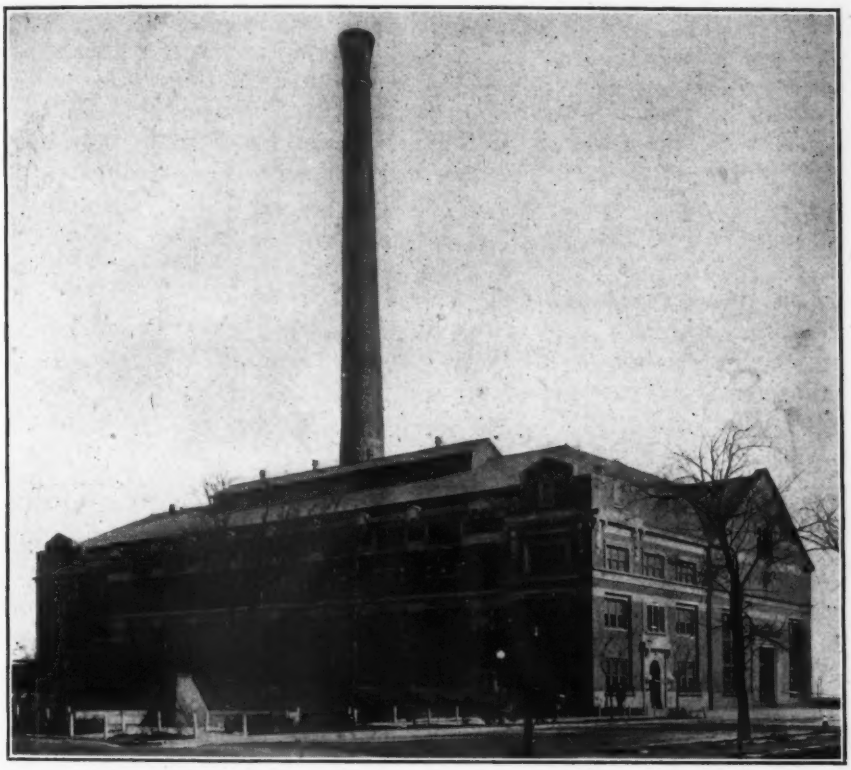

FIG. 4.—LAKEVIEW PUMPING STATION, LOOKING NORTHEAST.

PLAN OF TEST.

All radiators were shut off and the windows and doors closed as in cold weather. The room was kept under observation with these conditions until the interior temperature ceased to rise. It is evident that this is the point where heat loss balances the heat supply. By calculating now the heat losses from the building, from a careful analysis of construction, the amount of heat required to maintain this temperature is obtainable. This amount will be the heat loss, due to wall transmission, plus the heat required to warm the total amount of the air passing through the room, from the outside temperature to the room temperature. If the air change can be determined, it will be a simple matter to determine the amount of heat required to warm this air. This amount subtracted from the net total will give the heat supplied by the engines and accessories. It is necessary, therefore, to first determine the air change per hour. To solve this part of the problem the following method was used:

Eight empty oil barrels were placed on the first floor of the engine-room, three on the east side, three on the west and one each on the north and south sides. (See plan of engine-room Fig. 5.) In each barrel 12½ lbs. of dilute sulphuric acid were placed and at a given signal 18 lbs. of a satu-

rated solution of sodium bi-carbonate were added to each barrel. In this way carbon dioxide gas was liberated at a rapid rate and rather uniformly throughout the room. After a sufficient interval had elapsed to allow a complete chemical change to take place in the barrels that no further CO_2 gas be given off and to allow a thorough diffusion of the gas throughout the room, air samples were taken at various predetermined points and later analyzed for carbon dioxide.

In making the test the room was divided into four cross-sections and observations were made at six points, two on each side at three different elevations of each cross-section. These stations are shown in Fig. 5. The air samples previously referred to, together with the temperature and humidity observations, were taken at each of three points hourly. From the temperature readings the "Temperature Curve" (Fig. 9) was plotted, which was used to determine the temperature differences at various elevations. Readings on both sides of the boiler-room wall of the engine-room showed practically no temperature difference, hence no heat transmission would occur in this wall.

AIR CHANGE.

It is evident that the reduction in the amount of CO_2 in the engine-room shown by the hourly readings was due to dilution with the outside air. Knowing the amount of CO_2 in the room and the amount in the outside air it is a simple matter to calculate the air change from these data. The various CO_2 readings are tabulated herewith and from these the average CO_2 is found for each hour.

To show the method of arriving at the conclusions let us take 8.5 parts of CO_2 per 10,000, which is the amount recorded as the average amount in the

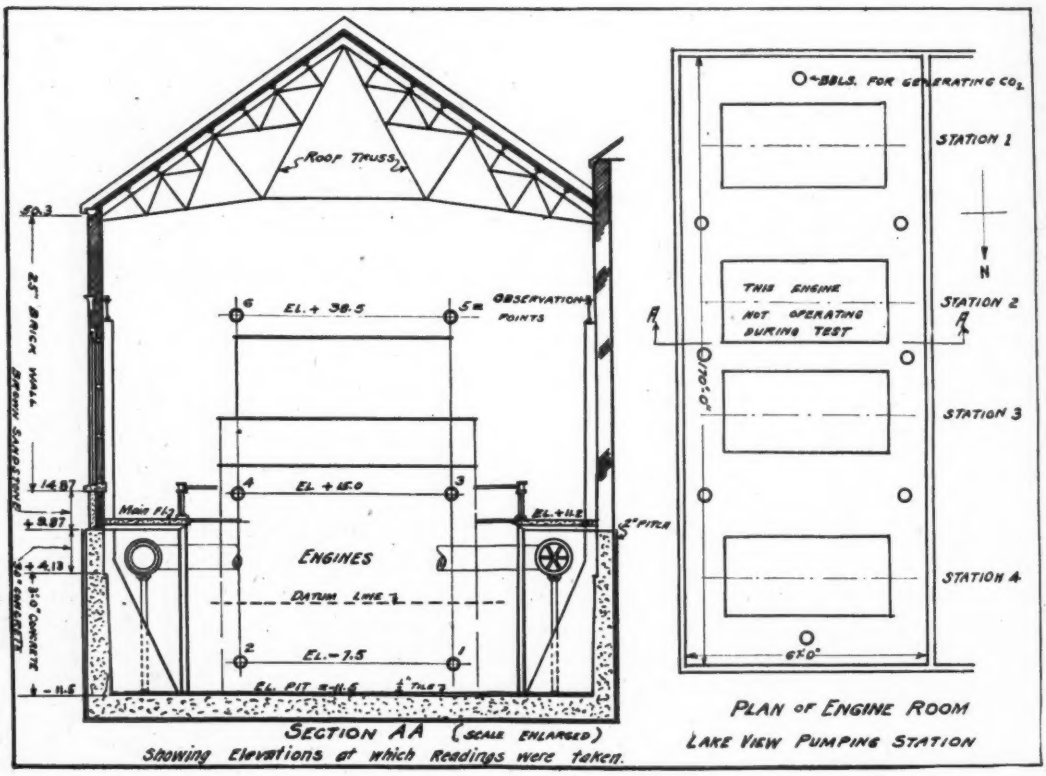

FIG. 5.—PLAN AND ELEVATION OF LAKEVIEW PUMPING STATION.

CO_2 RESULTS AT VARIOUS POINTS

	STATION 1 = INSP. WILSON				STATION 2 = INSP. BECKWITH				STATION 3 = INSP. KNIGHT				STATION 4 = INSP. STEWART			
POSITION	10:30 AM	11:30 AM	12:30 AM	1:30 PM	10:30 AM	11:30 AM	12:30 AM	1:30 PM	10:30 AM	11:30 AM	12:30 AM	1:30 PM	10:30 AM	11:30 AM	12:30 AM	1:30 PM
1	9.0	4.0	4.9	3.9	10.2	4.7	5.7	4.0	7.8	—	4.1	4.0	7.0	5.0	5.1	4.0
2	8.5	4.0	3.8	3.1	7.2	4.8	6.2 *	4.2	9.0	5.2	5.4	4.8	6.0 *	4.0 *	6.3 *	8.1 *
3	8.8	8.9	3.9	6.7 *	6.9	6.2	4.0	5.7 *	8.6	6.4	5.4	4.9	7.1	5.0	4.2	5.0
4	8.8	7.6	4.0	5.4 *	9.0	5.1	5.0	3.5	8.7	7.0	5.4	4.4	5.6 *	6.3	7.0 *	8.0 *
5	8.8	5.0	5.7 *	4.5	6.3 *	6.6	4.0	4.7	8.8	7.3	6.0	6.4 *	10.8	7.2	5.0	6.6
6	8.6	5.0	4.8	4.2	9.1	6.7	6.1	5.0	10.0	5.4	3.9	4.6	7.0	6.6	5.6	3.8
TOTAL	52.5	34.5	21.4	15.7	42.4	34.1	24.8	21.4	52.9	31.9	30.2	22.6	31.9	30.1	18.9	12.8
AVERAGE	8.8	5.8	4.3	3.9	8.5	5.7	5.0	4.3	8.8	6.4	5.0	4.6	8.0	6.0	5.0	4.3

NOTE:- READINGS MARKED * HAVE BEEN NEGLECTED AS BEING INCONSISTENT.

STATION	AVERAGES 10:30 AM	11:30 AM	12:30 AM	1:30 PM	TIME	CU. FT. CO_2 IN ROOM = AVERAGE X 75	DEDUCT FOR 18 PEOPLE IN ROOM.	CU. FT. OF CO_2 AFTER EACH COMPLETE AIR CHANGE	TIME FOR EACH AIR CHANGE FROM CURVE
1	8.8	5.8	4.3	3.9	10:30	85 X 75 = 640	640 = POINT 1	$\frac{640 + 263}{2} = 451$	55 MIN.
2	8.9	5.7	5.0	4.5	11:30	6.0 X 75 = 450	440 = " 2	$\frac{451 + 263}{2} = 357$	58 "
3	8.8	6.4	5.0	4.3	12:30	4.8 X 75 = 360	350 = " 3	$\frac{357 + 263}{2} = 310$	55 "
4	8.0	6.0	6.0	4.3	1:30	4.2 X 75 = 315	305 = " 4	$\frac{310 + 263}{2} = 286$	58 "
TOTAL	34.1	23.9	19.3	17.0					AVERAGE = 56½ MIN. PER AIR CHANGE.
AVERAGE	8.5	6.0	4.8	4.2					

FIG. 6.—RESULTS OF CO_2 READINGS.

room at 10:30 A.M. Since there are 750,000 cu. ft. of air in the room and there are 8.5 parts of CO_2 per 10,000, the total amount of CO_2 will then be

$$\frac{8.5 \times 750{,}000}{10{,}000} = 640 \text{ cu. ft.}$$

There were 12 men in this room during this hour and these 12 men gave off approximately 10 cu. ft. of CO_2; therefore, 10 cu. ft. are to be subtracted in all cases except the first (which is the starting point). In this manner the following results were obtained:

640 cu. ft. of CO_2 at 10:30
440 cu. ft. of CO_2 at 11:30
350 cu. ft. of CO_2 at 12:30
305 cu. ft. of CO_2 at 1:30

These points were then plotted and the "Air Change Curve" drawn (Fig. 7).

Samples of outside air showed 3.5 parts of CO_2 per 10,000, or 263 cu. ft. of CO_2 to 750,000 cu. ft. of air.

At the beginning of the test there were 640 cu. ft. of CO_2 in the engine-room. Adding to this a complete air

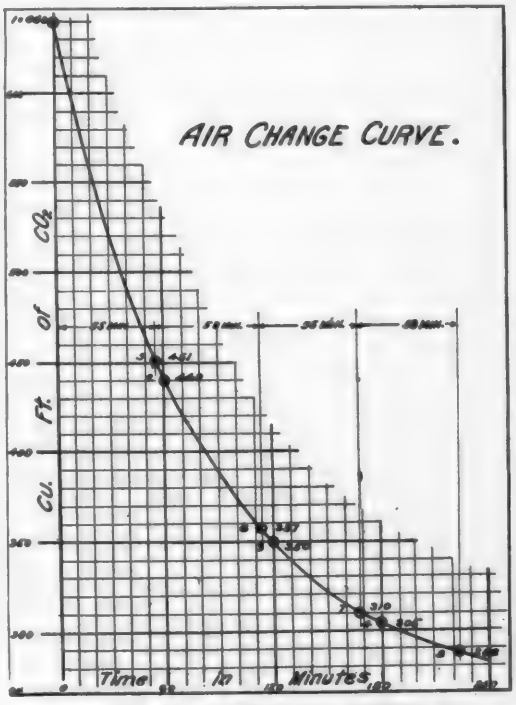

FIG. 7.—AIR CHANGE CURVE.

change we have 640 plus 263 = 903 cu. ft. of CO_2; this, however, is for a

volume twice the size of the engine-room and we, therefore, divide by 2, giving 451 parts of CO_2 in the engine room after one air change has taken place. The point is plotted on the "Air Change Curve" and the time noted (55 minutes) which corresponds to this CO_2. The first air change took 55 minutes.

Add 263 cu. ft. to 451 cu. ft. and divide by 2 we have 357 cu. ft. of CO_2 at the end of the second change, which is 58 minutes after the first.

Add 263 cu. ft. to 357 cu. ft. and divide by 2 and we have 310 cu. ft. at the end of the third change, equal to 55 minutes after the second.

Add 263 cu. ft. to 310 cu. ft. and divide by 2 and we have 286 cu. ft. at the end of the fourth change, equal to 58 minutes after the third.

The average of these four changes is 56½ minutes, which means one complete air change in 56½ minutes.

HEAT LOSSES.

As will be noted in the cross-section of the building the material of construction varied at different elevations. On account of the height of the room there was a difference in temperature of 40° between the air at the floor level and in the peak of the roof. It is evident from this that in computing the heat transmission through the wall the temperatures to be used must be those corresponding to that part of the wall in question. For this reason temperatures were taken at various points and the "Temperature Curve" drawn (Fig. 9), which curve is approximately a straight line.

HOW TEMPERATURE CURVE IS USED.

To illustrate the use of the "Temperature Curve" let us take the windows in the east wall for example.

Temperatures - Station 1 - Inspector Wilson

Position	Wet Bulb				Dry Bulb				Rel. Hum.				Average		
	10:30 AM	11:30 AM	12:30 AM	1:30 PM	10:30 AM	11:30 AM	12:30 AM	1:30 PM	10:30 AM	11:30 AM	12:30 AM	1:30 PM	W. Bulb	D. Bulb	Rel. H.
1	55	54	54½	54	63	62	62	61	60	60	62	63	54⅓	62	61½
2	55	54	54½	54	63	62	62	61	60	60	62	63	54⅓	62	61½
3	57	58	57	57	73	73	72	73	36	40	38	36	57¼	73¼	37½
4	57	58	57	57	73	73	72	73	36	40	38	36	57¼	73¼	37½
5	64	65	65	65	85	86	86	85	31	32	32	33	64½	85½	32
6	64	65	65	65	85	86	86	85	31	32	32	33	64½	85½	32

Temperatures - Station 2 - Inspector Beckwith

1					67	65½	66	66						66¼	
2					67	65½	66	66						66¼	
3					73½	74	72½	73½						73⅛	
4					73½	74	72½	73½						73⅛	
5					85	85	84	84						84½	
6					85	85	84	84						84½	

Temperatures - Station 3 - Inspector Knight

1	55	55	55	56	67	67	67	66	47	47	47	54	55¼	66½	48¾
2															
3	58	58	58	58	73	74	74	74	40	38	38	38	58	73¾	38½
4											Steam on				
5	63	63	66	64	83	83	83	83	32	32	38	35	63¾	83	34½
6															

Temperatures - Station 4 - Inspector Stewart

1					68	68	69	67						68	
2															
3					72	72	72	72						72	
4															
5					88	88	88	86						86½	
6															

FIG. 8.—TEMPERATURE READINGS AT DIFFERENT STATIONS.

The bottom elevation of these windows is about 14 ft.-10 in. and the top about 34 ft.-10 in., which gives an elevation of 24 ft.-10 in. for the center. The temperature which corresponds to 24 ft. 10 in. elevation on the "Temperature Curve" is 78° and this is assumed as the inside temperature. The outside temperature for this point is 65°, which gives a temperature difference of 13°. This method was used throughout the following computations:

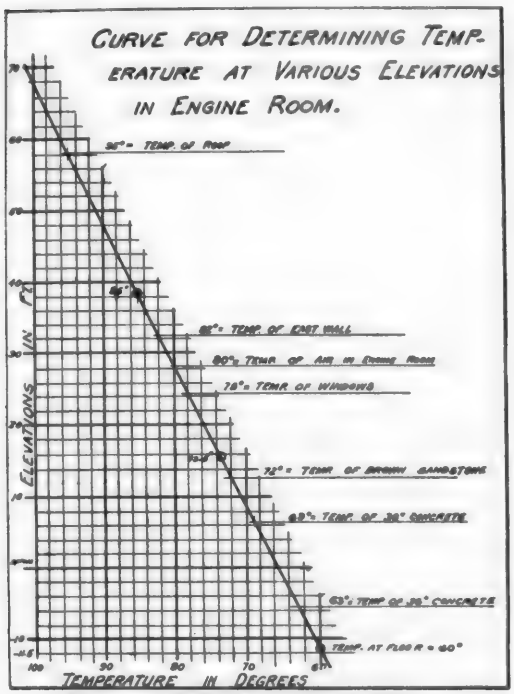

FIG. 9.—TEMPERATURE CURVE.

HEAT LOSS THROUGH WALLS:

Volume = 170 x 67 x 73 = 831,470 cu. ft.
Deduct for machinery 83,170 cu. ft.

748,300 cu. ft.

say 750,000 cu. ft. net air change.
Area of floor = 170 x 67 = 11,400 sq. ft.
5,400 sq. ft.

6,000 sq. ft. net exposed floor area.

FLOOR:

3-ft. concrete on 2-in. waterproof topped with ½-in tile.
½-in. tile coef. = 0.31.
3 ft. concrete coef. = 0.22.
2 in. pitch coef. = 0.40.

$$\text{Coefficient} = \frac{1}{\frac{1}{0.31}\ \frac{1}{0.32}\ \frac{1}{0.40}} = \frac{1}{10.28} = 0.098.$$

Temperature of floor = 60° F.
Temperature outside = 45° F.
6,000 x 0.098 x 15 = 8,800 total B. T. U. loss.

ROOF:

Area 80 x 170 = 13,600 sq. ft.
3-in. T and G. yellow pine, slatters' felt and slate Coef. = 0.25.
Temperature of roof = 95°.
Temperature outside = 64°.

31°.

13,600 x 0.25 x 31 = 105,400 total B. T. U. loss.

EAST WALL: Facing Lake Michigan, with no building intervening.

Basement wall, 3 ft. concrete with 2 in. pitch
from — 11.5
to + 4.13

15.63 ft.

Coef. = 0.14.
Length = 170 ft.
Temperature difference = 63° — 45° = 18°
15.63 x 170 x 0.14 x 18 = 6,600 B. T. U. loss.

From elev. + 4.13 to + 9.87 = 5.74 ft.
30-in. concrete with 2-in. ptch. Coef. = 0.15.
Temperature difference = 69° — 45° = 24°.
Length of wall = 170 ft.
5.74 x 0.15 x 24 x 170 = 3,530 B. T. U. loss.

From elev. + 9.87 to + 14.87 = 5 ft.
25-in. brown sandstone. Coef. = 0.30.
Temperature difference = 72° — 64° = 8°.
Length of wall = 170 ft.
5 x 0.30 x 8 x 170 = 2,040 B. T. U. loss.

Windows—Seven at 10 ft x 20 ft. = 1400 sq. ft.
Each window = nine lights 30/69. Coef. = 0.90.
Temperature difference = 78° — 65° = 13°.
1400 x 0.90 x 13 = 16,380 B. T. U. loss.
From elev. + 14.9 to + 50.3 = 35.4 ft.
25-in. brick wall. Coef. = 0.20.
Temperature difference = 82° — 65° = 17°.
35.4 x 170 = 6018 sq. ft.
less 1400 sq. ft. windows.

2618 sq. ft. net.
4818 x 0.20 x 17 = 15,700.

Total for East Wall = 44,250 B. T. U.

SOUTH WALL: 67 ft. long, facing Montrose Boulevard, elevation and coefficient of structure same as for East wall.

3-in. concrete = 15.63 x 67 x 0.14 x 18 = 2646 B. T. U. loss.
30-in. concrete = 5.74 x 67 x 0.15 x 24 = 1392 B. T. U. loss.
25-in. sandstone = 5 x 67 x 0.30 x 8 = 800 B. T. U. loss.
Windows (two at 10 ft. x 20 ft.) = 400 x 0.90 x 13 = 4680 B. T. U. loss.
Gable Windows, 3½ x 7 ft. = 75 sq. ft.
Coef. = 0.94.
Temperature difference = 90° — 64° = 26°.
75 x 0.94 x 26 = 1820 B. T. U. loss.

TRANSOM:
12 x 5 ft. = 60 sq. ft.
Coef. = 0.95.
Temperature difference = 78° — 64° = 14°.
60 x 0.95 x 14 = 800 B. T. U. loss.

DOOR:
12 x 12 ft. = 144 sq. ft.
Coef. = 0.50.
Temperature difference = 75° — 64° = 11°.
144 x 0.50 x 11 = 792 B. T. U. loss.

25-in. brick wall = 25.4 x 67 =	2371 sq. ft.
less door and windows =	681 sq. ft.
	1690 sq. ft.
Area of gable	710 sq. ft.
	2400 sq. ft.

240 x 0.20 x 18 = 8640 B. T. U. loss.
Total for south wall = 21,570 B T. U. loss.

NORTH WALL: Protected by a coal-storage building 15 ft. away.
Same as south wall = 21,570 B. T. U. loss.

WEST WALL: Against boiler room.
Temperatures in boiler room were found to practically balance temperature in engine room, hence no heat transmission.

HEAT LOSS DUE TO AIR CHANGE.

From the accompanying air-change curve (Fig. 7) it was found that one complete air change took about 56½ minutes.

The average temperature in engine room (Fig. 9) = 80°.

Temperature of entering air = 65°.

B. T. U. required to raise 1 cu. ft. of air from 65° to 80° = 0.267.

$$750{,}000 \times 0.267 \times \frac{60}{56.5} = 213{,}000$$

B. T. U. per hour.

Total Heat loss = Total Heat Supplied.

Floor	8,800
Roof	105,400
East Wall	44,250
South Wall	21,570
North Wall	21,570
Air Change	213,000
Total	414,590 B. T. U.

Since only three engines were operating throughout the test, each engine and its accessories furnished 414,590/3 = 138,200 B. T. U., or 138,200/970 = 143 lbs. of steam at 2 lbs. pressure per engine, equal to 143 x 4 = 572 sq. ft. of cast-iron direct radiation. This equivalent was used for each engine in calculating net radiation required for the Mayfair plant.

The Engineers' Place in the Sun.

A complaint that the engineer is getting more than his due share of government work these days is made by the *Architectural Forum*, which devotes several pages of its March issue to letters from architects on the theme of how architects can gain a larger recognition. This will sound like music to men in the heating trade who have felt that the situation was just the reverse, at least as far as the general public is concerned.

"When our government entered the war," says the *Architectural Forum*, "and began preparations on a large scale for its prosecution, it was thought quite naturally that the achievements of the architectural profession would be an appreciated guiding post and that the preparation of the government's building plans would be placed in the hands of architects. Were they? No. Engineers and contractors who furnished the 'know how' were given precedence, while architects were dismissed as visionary artists."

In the letters sent in, one correspondent states: "The closest competitor of the architect today (except perhaps the other architect) is the engineer, and the next in order is the decorator. Can the engineer design better industrial and commercial structures than can the architect? Not if the architect is a real architect. The real architect can and does put into his product a basic element necessary to the larger life which neither of these others can, in the very nature of things, supply. Could the engineer solve his problem in the spirit of beauty, he would cease to be an engineer and become an architect."

Another correspondent writes:

"Let us attempt first to determine what the most complicated and difficult building operations are. Take the great bridge over Hellgate. It is a question of study of conditions to determine the type of bridge, the position of piers, the foundations, the span, the details of the truss. Take as a comparison the New York Municipal building. This involves every engineering problem of foundations and steel, and in addition the most comprehensive and detailed study of every

department to occupy the building, the economical arrangement of the plan for the efficient execution of the work, corridors and elevators for service, and problems of heating, ventilation, power, electric service, and plumbing, and in addition to this that knowledge of design which makes it possible to weld this complete mass of detail into an harmonious whole. The first is simple compared with the second. The first is typically an engineering piece of work, the second is typically an architectural one.

"Or, to take more everyday comparisons, a manufacturing plant, or mill, and a hospital. The one requires the study of one unit or bay for certain requirements of light and for certain floor loads, and then the duplication, with perhaps modifications for special uses or loads of this bay—the study of heat, power, and its application and use. The other requires study of all the structural problems of the mill, and in addition study of all details connected with patients, nurses, doctors, and servants, details of operation, administration, and service. Again these must be coordinated, harmonized, and brought to a logical and therefore beautiful conclusion. Again, the first is rather in the province of the engineer, while the latter is in that of the architect. The first is simple, the second is complicated. Moreover, it is to be noted that the architect could readily do the former, indeed would consider it very easy; while the engineer would find the latter very difficult if not impossible, because his engineering training has not taught him how to do it.

"Let the layman in any large center consider some of the important building operations of which he knows and see whether without an architect such undertakings would have been possible.

"Put briefly, when it is a question of building, it is the simpler, less complex problems which the engineer solves; it is the complex ones, often involving the engineers' problems as well, which the architect handles."

The inroads being made into the architectural profession by contracting companies is referred to by another correspondent who states: "While every day is seeing a new raid on what architects have fondly imagined to be their own particular domain, made either by the engineers or by interior decorators, or landscape artists, or contracting companies, it is too petty a business for the Institute (of Architects) to concern itself with chastening the small-town practitioner who squares the local paper by inserting his card. While the architects have been saying 'After you, my dear Alphonse,' to each other, certain pawky and hard-headed engineers who care about as much for ethics as they would for an old cellar wall which might come in the way of their operations, have developed selling organizations for plans, buildings, and all which are rapidly undermining the ground beneath the architects' feet. While the architects have been busy perfecting a new standard contract, which shall be more equitable for the suffering contractor, the latter has, without consulting them, gone ahead with his 'cost plus' propaganda, which absolutely assures him against loss and shifts all the risk over onto the owner."

Still another correspondent proposes that "the American Institute of Architects, or any representative body, consult with the engineering socieies or contractors' associations and agree upon a line of separation of activities, or upon a degree of co-operation."

Finally a Western architect laments the fact that "in all building in recent years the credit for speed in construction has been taken by the contracting firms, who have advertised the fact extensively. They have dwelt at length on 'wonderful organization,' 'wonderful systems of accounting;' they have invented or adopted terms and titles, such as 'Industrial Engineer' and 'Efficiency Engineer or Expert,' and they have assumed full and public responsibility for their success in every instance, and admit its direct relation to the great organization they have built up.

"The architect has indulged in no advertising. He even doubted the propriety of allowing his name to be included in smallest letters on the blatant signs by which the contractor announced that he was 'it.' He has taken no credit for the building under construction, even though its speed and success were as much, or more, due to him as to the contractor. The public thinks the term 'designed by an architect' relates only to some senseless ornamentation or detail, and not at all to the conception of the building in plan, arrangement, construction or composition, or to its success as a solution of a difficult building problem.

"Moreover, the architect has, by the nature of his work and by his ideas of professional practice, isolated himself from a direct and absolute knowledge of building costs and responsibility for them. He has assumed an advisory position, and for real ideas of cost has deferred to the construction companies. He has not assumed to have financial responsibility—it is therefore assumed that he has none. He has not assumed to have knowledge of exact building costs—therefore he is not considered a judge. This idea has been unduly advertised by stories, sometimes true, of exceeded appropriations, always without a statement of the causes."

THE HEATING AND VENTILATING MAGAZINE

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IT IS now evident that the proposed research bureau for the establishment of proper methods and standards for heating and ventilating work has passed beyond the talking stage. Concrete plans have been whipped into shape and the manufacturers and dealers will shortly be given the opportunity of doing their share in financing the project. That it is a distinct opportunity for them may easily be shown.

In the first place it will broaden this field immeasurably. It is no exaggeration to say that at the present time the limitations of the industry, especially on the ventilating side, are being profoundly affected by the suspicion in high quarters that the expensive equipment required by present standard practice is not giving results commensurate with its cost. Today, for instance, in the city of Buffalo, the authorities are considering a new system of heating and ventilation for its more important school buildings based on the conviction that the apparatus installed, some of which at least is modern, does not meet the requirements. Everyone is familiar, also, with the publicity recently given to the tests made by the New York State Commission on Ventilation which give window ventilation a remarkable endorsement in the prevention of respiratory diseases. In short the trend is not towards the wider adoption of the present elaborate types of apparatus.

In the second place, the research bureau may be expected to standardize many of the present practices for given classes of work, if not the apparatus itself, and this will serve to stabilize the industry by eliminating freak constructions and giving the manufacturers a more definite basis for gauging the necessities of the market and their own output.

Finally, the crying need for the work will never be met unless the manufacturers stand squarely behind it and give it their support. It needs no argument to show that the engineers by themselves have never been able, and less so now than ever, to take up the work on an adequate scale, although the initiative properly belongs to them and their findings will have far greater weight than if made by the manufacturers alone.

The manufacturers, as a class, have long since proved their sincerity to the cause of good engineering and there is no reason to doubt that they will back up this new line of research work with the same enthusiasm and devotion that they have shown in perfecting the design and construction of their individual products.

ARE you co-operating in the plans for building bigger business by going after "new equipment for old buildings?" Read the Trade Extension Committee's four-page insert in this issue. It reflects a careful study of the situation. Prompt action means not only more individual profits but a boost to the trade at a critical time.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Research Bureau and Fuel Limitation Projects Advanced at Buffalo Meeting, June 26-28, 1918

Rules for limiting the supply of coal to domestic consumers next winter, which may be adopted and put into effect throughout the country by the United States Fuel Administration were advanced to their final stages at the summer meeting of The American Society of Heating and Ventilating Engineers, in Buffalo, June 26-28, 1918. They will now be submitted to the Bureau of Mines and, if approved by that body, will be turned over to the United States Fuel Administration. Both of these departments have signified that the Society's suggestions on this matter will be welcomed and given the utmost consideration.

FREDERICK R. STILL
President, American Society of Heating and Ventilating Engineers.

The rules, while not given out for publication pending further possible alterations, follow, in a general way, those proposed at the annual meeting of the Society and provide roughly for one ton of coal per room per month during the heating season for house heating systems and limited supplies of coal for cooking depending on the number of persons in the household.

Further progress was also made in the Society's plans for a research bureau. It is expected that the raising of funds for maintaining the bureau will be taken up this summer and the bureau started possibly before winter. Owing to the equipment and facilities of the Bureau of Mines' testing station in Pittsburgh it is probable that the Society's principal researches will be conducted at that bureau.

The war cut down the attendance somewhat. The programme, however, was a full one and many of the papers brought out lively and interesting discussions. This was particularly true of the drying session.

An attendance of 120 members and guests was registered.

Morning Session, June 28.

Mayor Buck welcomed the society to Buffalo. He congratulated the society on its work, especially in the field of fuel conservation, which was calculated to make the society's activities of national interest and importance. Buffalo, he said, had figured large in the history of the United States, having been burned by the British in the Revolutionary War, while in the Civil War the city had a record of having enlisted every male citizen in that struggle. Buffalo's

slogan today is "Buffalo Never Fails," and the members may rest assured that Buffalo will not fail this time in its welcome and entertainment of the members.

H. G. Issertell responded to the mayor's welcome.

President Still announced that the proposed session on district heating had to be given up, owing to difficulties in making the necessary arrangements with the National District Heating Association.

He then presented a paper which he described as a "bombshell."

PROPOSES CHANGE IN NAME OF SOCIETY

President Still proposed nothing less than a change in the name of the society to embrace the extended field of activities now covered in the work of its members. Mr. Still proposed some such name as the "American Society of Consulting Engineers."

The war, he said, has already shown what engineers are made of. There is no other profession which has done so much with so little notice taken of its achievements. Engineers, he said, are to blame for this condition.

He declared that after the war engineers should proceed to take part in the world's political affairs. They will need to run the country during the reconstruction period.

He said there was a distinct danger of agitators taking possession of the country with the possibility of an economic and political breakdown. Engineers must not think it unethical to mix in public affairs.

It was at this point that he suggested changing the society's name. Heating engineers are now exercising the functions of consulting engineers and are coming to have charge of the entire mechanical equipment of buildings. He differentiated between the mechanical engineer and the consulting engineer by classifying the former as the designer of functional apparatus while the consulting engineer's province is the application of such functional apparatus.

The proposed change of name, he added, would widen the scope of the society's work and would result, among other things, in attracting a much larger membership.

President Still went even further and suggested that the society get in touch with commercial organizations in the heating field and co-operate with them in the making of tests and establishment of standards. Such organizations, he said, could be represented in the society by bureaus.

The proposed "American Society of Consulting Engineers" would embrace, not only heating and ventilating engineers, but mechanical, electrical and chemical engineers whose work is embraced in the mechanical equipment of buildings.

A communication was read from the United Association of Steam Fitters announcing that they had appointed two delegates to represent the association at this meeting. This is the first time this action has been taken, and the delegates were given a hearty welcome by President Still.

REPORT OF FUEL CONSERVATION COMMITTEE.

J. I. Lyle presented the report of the Committee to confer with the Bureau of Mines, with special reference to the development of a rule for allotting coal for house heating during the coming winter. The committee's report was not given out for publication pending its consideration by the Bureau of Mines.

One speaker emphasized the importance of stopping the air leaks in the chimneys. He also stated that the fire combustion temperature is a better index to the conditions in the heating system than the stack temperature. He gave a number of instances where the construction of the chimney was faulty.

Mr. Collamore said that many people

accustomed to burn hard coal would be compelled next winter to use bituminous coal and that they should, therefore, be exempted from the smoke ordinances.

Mr. West said that the personal equation was the determining factor in the coal requirements and that the amount of coal used, either north or south, depended to a large extent on the man running the heater.

Mr. Timmis urged the endorsement by the society of the committee's plan for the conservation of fuel. On his motion, it was voted to approve the general plan of the committee in proportioning coal. A rising vote of thanks was extended to the committee, which included J. Irvine Lyle, chairman; George W. Martin and Perry West.

PUBLICATION OF CHAPTER PAPERS

President Still brought up the question of the rights of the chapters in publishing papers read before the chapters before they had been submitted to the society's publication committee. An amendment to the society's constitution was proposed providing for the appointment of publication committees of the chapters so that, under certain conditions, such papers or addresses could be released immediately for general publication. This proposed amendment will be voted on at the next annual meeting of the society.

The first professional paper was then presented on "The Heat Transmission of Standard Building Materials" by A. C. Willard. The substance of this paper, was published in a recent bulletin (No. 102) of the Engineering Experiment Station of the University of Illinois.

It was voted to refer the paper to the society's committee on research bureau with instructions to prepare a comparative table showing how closely the constants given by Professor Willard coincide with those in general use.

A report was presented of the work of the Chicago Commission on ventilation. Samuel R. Lewis, a former president of the heating engineers' society, is now president of the commission. A list was given of the tests already made by the commission which are being published in THE HEATING AND VENTILATING MAGAZINE, as well as those the commission has in prospect. Those completed and still to be published include the following:

Korshak Workshop: A test of the air conditions in a ladies' tailoring establishment located in a basement.

Chicago and Cook County School for Boys: A test of the ventilation of a school building equipped with direct-indirect radiators and exhaust mechanical ventilation.

School Heating and Ventilation: An application of the observations made by the Commission.

A Ventilation Paradox: A paper describing the use of air for ventilating purposes, this air being derived from a deep freight tunnel.

Ventilation of the General Office Buildings of Two Railways: A test carried through an entire heating season for developing comparative results obtained with the natural ventilation installed in one of these buildings, and the mechanical ventilation installed in the other.

Further studies of the operation of the experimental room at the Chicago Normal School.

A study of the ventilation and heating of open-air schools as compared with the ordinary schools.

Afternoon Session, June 26.

The representatives of the United Association of Steam Fitters were introduced by President Still. They expressed the hope that opportunity would be found for closer co-operation between the two organizations, one of the delegates, Mr. Cook, referring especially to the many examples which he had found in Chicago of poor heating installations.

Professor J. E. Emswiler then presented a paper on "Electrical Method of Testing Radiators."

The Electrical Method of Testing Radiators.

Professor Emswiler presented details of the methods used at the University of Michigan for testing radiators by electrical means, using an electric heater to generate the steam consumed by the radiator and the determination of the heat required for this by measurement of the energy consumed in the heater. A series of tests was made on a 38-in. 3-col. 12-section cast-iron radiator using first the electrical method, and afterwards the steam method. All the tests were made in the same room, with all conditions as nearly alike as possible.

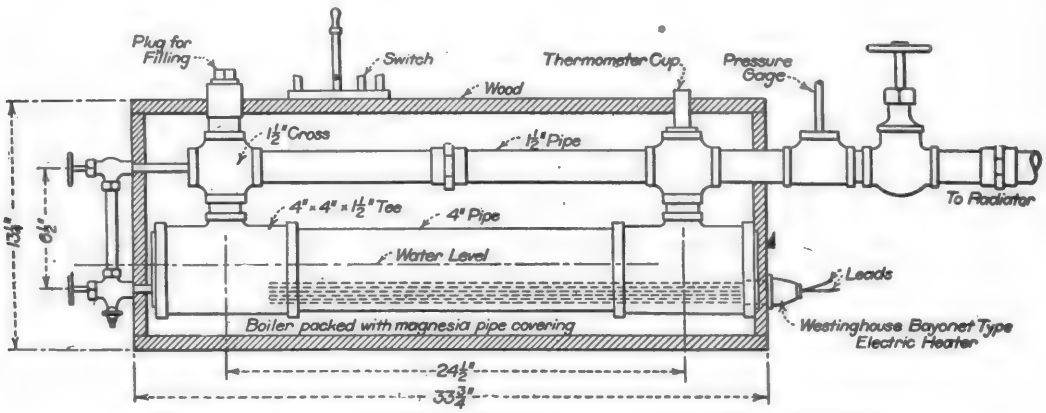
For the steam method the value of K (B. T. U. per hour per square foot per degree difference), averaged for the tests, was 1.643. For the electrical method the value of K, averaged for the three tests, was 1.661. Curves were included showing the observed values of the most important quantities, as plotted during tests. These curves, it was pointed out, are valuable for indicating when conditions become constant. They also show the different effects of the two radiators on the distribution of temperature within the room. On the whole, stated the author, the electrical method is superior to the steam method of testing radiators.

In the discussion James H. Davis brought up the results of tests conducted by Professor Emswiler on cast-iron and pressed steel radiators in which the steam consumption in the cast-iron radiators was greater without any better heating effect than with pressed steel radiators. Professor Emswiler stated that he had not been able to account for this difference.

Thomas Chester, engineer for the American Blower Company, presented a paper on "Ventilation of Mines."

Ventilation of Mines.

Mr. Chester's paper was one presented at the March meeting of the New York Chapter. It was a very complete review of the development of mine ventilation in this country and reflected the author's familiarity with this line of work. Commenting on the general subject of coal mining, he said that "no doubt at some future time the internal heat of the earth will be made use of for heating factories and residences and it seems absurd to keep such a large army of men at work digging out coal when a few shafts in each city driven down from 5 to 10 miles would furnish all the heat necessary by allowing water to descend to the heated interior to be turned into steam."



APPARATUS FOR TESTING RADIATORS BY ELECTRICAL METHOD.

The majority of mines are equipped with fans which either deliver air to or exhaust it from the workings. Most mine fans are made reversible. The amount of air used to ventilate a coal mine is usually from two to three times the weight of the coal taken out in a given time. Explosions in mines are produced by ignition of methane in most cases and this is greatly intensified by the subsequent immediate combustion of the dust.

The point of paramount importance is to ascertain the resistance which the mine will offer to the required volume of air. The required volume is calculated by making allowance for the number of men and animals in the mine and by additional allowances for removing gas. Coal is mined usually from seams at some distance below the surface and it is necessary to bore shafts to get to the coal. In such cases the resistance will vary from 1 in. to 6 or 7 in.

State laws usually call for 150 cu. ft. of air per minute per man in non-gaseous mines and 200 cu. ft. per man in mines producing a good deal of gas. The allowance for mules is usually 500 cu. ft. per minute per animal. The friction of airways is the cause of mine resistance. The friction is calculated by the formula:

$$F=KSV^2$$

where K = a suitable coefficient; S = the total square feet of rubbing surface or perimeter multiplied by the length of airway; and V^2 = the velocity in feet per minute squared. The coefficient most extensively used is that recommended by Fairley, which is 0.000,000,01.

Mr. Chester also discussed the testing of mine fans.

Mr. Timmis suggested that in accordance with the larger scope of the society's activities as proposed by President Still in his address, the society should go on record as advocating the wider enactment of mine ventilation laws. A motion to this effect was passed.

President Still said it was a very difficult matter to determine the air flow ir a mine.

Frank K. Chew suggested that Mr. Chester's paper be brought to the attention of the mining engineers' society.

Mr. Lyle said the greater number of explosions in coal mines was in the winter time. This, he said, was due to the dryness of the air. Attempts to moisten the air by the use of steam had been tried.

Mr. Chester said numerous attempts had been made to moisten the air, but that it was necessary to heat the air to prevent condensation so that it became a difficult proposition inasmuch as upward of 1,000,000 cu. ft. a minute are frequently handled in mine ventilation.

A topic was brought up on the question of the flow of condensation in a one-pipe system when the steam flow exceeds 15 ft. per second. Mr. Chester thought that a velocity of 20 ft. a second would be about the limit, based on experiences with the pneumatic transportation of materials where the required air flow is usually at 1200 ft. per minute.

WINDOW VENTILATION VS. MECHANICAL VENTILATION.

Another topic was the comparative advantages of window ventilation and mechanical ventilation. President Still spoke of the publicity being given to the ideas of the window-ventilation advocates and thought the society should take some definite stand on the subject.

Mr. Davis stated that the tests of the Chicago Commission on Ventilation in this line of work showed that buildings mechanically-ventilated give better results than with open-window ventilation.

Perry West spoke of the results obtained by the New York State Commis-

sion on Ventilation which showed fewer respiratory diseases with open-window ventilation. These results, he said, were misleading, as, for instance, a study of the tests indicated that the rooms with open-window ventilation were kept at about 68°F. while those with mechanical systems were usually at 70°. This alone, he said, might account for the difference noted.

Mr. Timmis said it was unfortunate that the society had not been represented in the tests made by the New York State Commission, as modifications, especially in the technical data, might have been found necessary that would have harmonized the results with those usually observed.

In reply to a point made by one speaker that people in Siberia live in tight houses during the cold weather, President Still said that the answer to such a practice was the appalling death rate from tuberculosis in that country. Moreover, at this time, when fuel conservation is being practiced, the use of open-window ventilation is manifestly out of the question.

Frank K. Chew proposed the appointment of a committee on propaganda or a lecture committee to bring the elements of good ventilation to the attention of the general public.

Under topical discussion, the subject was introduced of "The Use of Independent Air Heater Units for Factories, Warehouses and Large Interior Spaces."

H. F. Rosenow explained the construction and operation of the Baetz air heater, a description of which was published in THE HEATING AND VENTILATING MAGAZINE for January, 1918.

In answer to a question as to the advantages of this system when four or more units are necessary, Mr. Rosenow said the cost would be less with the individual units than with the ordinary fan blast system.

Another unit system was described by Thomas Chester and illustrated by lantern slides.

President Still said the principal usefulness of the unit heater was in buildings already built with perhaps no provisions for heating and, in some cases, in extensions of buildings.

In answer to a question Mr. Rosenow said that it was not unusual to blow a distance of 500 ft. with the unit heater. Mr. Still said this could be done provided the ceiling was not too high. Mr. Rosenow said this was contrary to his experience and cited a building with an interior height of 87 ft. which is being satisfactorily heated in this manner, with little variation in temperature.

Announcement was made of the election of the first woman to junior membership in the society, Miss Helen Innis, of New York. Miss Innis was present and was welcomed by President Still. She responded, thanking the society for its action.

Morning Session, June 27.

A report of the Research Committee was presented at the opening of the morning session. This is the committee in charge of the plan for establishing a laboratory by the Society to develop definite heating and ventilating standards and methods.

Perry West presented the report. He said it was proposed to call it "Research Bureau of the American Society of Heating and Ventilating Engineers," to be conducted under the supervision of a standing directing committee of the Society. A director will be necessary.

The plan is to co-operate with the United States Bureau of Mines and educational institutions. All of the bureau's conclusions are to be put out as the official conclusions of the Society.

Mr. West outlined the plan which included the determination of proper heating and ventilating conditions and the determination of the best method of maintaining such conditions. It is also planned to place the most commonly-used systems upon a more scientific basis.

Fuel burning will occupy an important place in the work of the bureau, while an attempt will also be made to establish a more scientific basis for the factor of heat losses, radiator efficiencies, natural air changes, pipe sizes and the determination of factors for air duct design.

Finally, unusual conditions in such structures as tall office buildings, and factories, will be considered, as well as intermittent heating service.

It is estimated that the cost of conducting the bureau will be $10,000 per year. It is proposed to raise this sum by pro-rating the cost among manufacturers of heating and ventilating apparatus. The plan is to raise enough funds at the outset to carry on the work for a period of five years. According to present plans the campaign for raising the necessary funds will be started this summer.

It is proposed to make arrangements with the testing plant of the Bureau of Mines in Pittsburgh for making the principal tests, although efforts will also be made to extend the scope of the work to universities and colleges.

DRYING SESSIONS

The session on drying was opened with a paper by W. A. Perry on "How Food Will Win the War."

How Food Will Win the War.

Mr. Perry pointed out that the big problem of the United States Food Administration is not that of prices, but the distribution of the available food supply. Perhaps his most significant statement, as far as the heating engineer in concerned, as offering possibilities for drying work, was that "over against our shortage of wheat, meats, fats and sugar, we have abundant resources in corn, potatoes, vegetables, fish and poultry. For various reasons these products cannot be economically shipped to Europe. In some cases the bulk is too great, in other cases the products will not keep in transit, and in the case of corn, we find that the Europeans have not yet been educated to its use."

H. C. Gore, chemist with the Department of Agriculture, then addressed the meeting, describing the progress made in the drying of vegetables since his previous report at the Society's January meeting.

Dr. Gore spoke first of the possible saving of freight, amounting, in the case of dried tomatoes, to 99%. There is also the enormous saving in space. The department has been working on the laboratory phase of the problem, with special reference to the proper moisture content of vegetables dried raw. It is much cheaper, he said, to dry vegetables in a raw condition.

Unless the dried product is brought to a proper moisture content there will be deterioration. The department is now in a position to state the proper moisture content for both raw-dried and cooked-dried vegetables, and to tell the effect of heat on these products. The result of its findings will shortly be published in bulletin form.

With cooked vegetables not so much drying is required. Dr. Gore distributed charts showing the effects of temperature and time on the quality of the dried product.

The department has developed a type of dryer known as the "general purpose" dryer. It has not as yet gone into the matter of drying fruits.

Professor Gross of Cornell University told of the difficulties in drying potatoes. When sliced the slices are apt to stick together. They must also be thin, and must be properly cooked. He said there is still lots to learn about drying potatoes and he urged those interested to take up one particular product like potatoes and specialize on that one problem.

In answer to a question Dr. Gore said rapid air movement through the dryer serves to give a uniform velocity. It has not yet been determined what is the effective length of dryer.

VACUUM DRYERS

Nathan Owitz, of the J. P. Devine Co., addressed the meeting on the possibilities of the vacuum process in drying both fruits and vegetables. He said that while the first cost of such apparatus is higher, the operating cost is surprisingly low. All danger of burning the product is eliminated by the low temperatures carried. The usual practice is to boil the product in a vacuum of from 28 to 29 in. mercury, giving a uniform air temperature between 101° to 155° F.

President Still said that in some cases lumber is being successfully dried by the vacuum process.

One advantage brought out for the vacuum heating process is that the product is not discolored, a most important point in marketing the dried fruits or vegetables. B. S. Harrison stated that discoloration is not necessary in warm-air drying.

Announcement was made that a thrift kitchen is in operation in Buffalo in which both warm air dryers and vacuum dryers are in operation. The members were invited to attend a dehydrated luncheon where all the courses are made up of dried food. It was stated that it was almost impossible to distinguish the dishes from those made in the ordinary way. A party of 24 later visited the thrift kitchen and partook of a "dried" luncheon which proved excellent.

The preparation of such food for the table, however, is an important matter. This is a separate problem in itself, but can be easily handled by following the proper directions.

W. L. Fleisher presented a paper on "Food Dryers and the Use of Schoolhouses for Drying."

Food Dryers and the Use of Schoolhouses for Drying.

In this paper Mr. Fleisher amplified his ideas expressed at the February meeting of the New York Chapter urging the use of the heating and ventilating equipments in public school buildings throughout the country for the drying of food stuffs. In New York City alone, he said, there is actual apparatus sufficient to dry enough food to feed 2,000,000 men, three meals a day, every day that this apparatus is run. Although the drying of foods is a very old process, Mr. Fleisher stated that its development has been retarded principally by the lack of a commercial outlet for the product and by the idea that the drying of foods is a very complicated process. By using the school building equipments, as suggested, the author stated that fans, heaters, boilers and the trays or kilns and tunnels in which to place the food products, were really the only things required for this work, so that nothing new, strange or unusual had to be developed. The trays or kilns could be made of wood and in very simple ways, while the rest of the apparatus was practically ready for use.

It was Mr. Fleisher's idea that basement corridors in mechanically-ventilated school buildings could be turned into tunnel dryers by means of wooden partitions, or, where the corridors are narrow enough, only cut-offs and divisions would be essential. The heated air could then be blown into one end of the corridor and the duct blanked off with a damper beyond this outlet. At the far end of the corridor or tunnel, another damper could be placed and an inlet located at this point, with a connection taken from a point beyond the first damper back into the fan so that recirculation from the far end of the tunnel could be obtained. In many cases State and Federal building plants could be utilized in the same way.

In addition to a bibliography on food drying and dryers, the paper contained a table showing the chemical composition of fresh and dried vegetables which emphasized the fact that all vegetables contain from 70 to 95% of water.

On motion of Mr. Timmis it was voted to bring the substance of Mr. Fleisher's paper to the attention of the Department of Agriculture and of the United States Food Administration and to appoint a committee to draft a digest of Mr. Fleisher's suggestions to be sent to those bodies. President Still appointed as the committee, W. L. Fleisher, chairman; R. T. Coe and Dr. H. C. Gore.

On account of the amount of work required to prepare the vegetables and fruits for drying, Dr. Gore suggested that the proposition should really be developed as a cannery adjunct, because canneries have all the preparatory equipment.

Mr. Fleisher stated that the large hotels could well be used and Mr. Owitz said that one New York hotel, the Manhattan, had already been successful in preparing and drying vegetables, using the vacuum heating process.

On the topic of community dryers, a scheme for a community warm-air drying system was submitted by A. S. Kellogg.

Before the session closed a campaign for increasing the Society's membership was discussed. William F. McDonald said that all of the Chapters could greatly increase their membership while many cities, such as Washington and San Francisco, offered opportunities for the formation of new chapters. Professor Hoffman proposed institutional memberships, to be taken by colleges and universities and by manufacturing plants.

Afternoon Session, June 27.

After a delightful boat ride on Lake Erie to the Buffalo Canoe Club the afternoon session was convened in the club house directly over the water. Here amid mild breezes the papers of the afternoon session were read and discussed.

Professor J. D. Hoffman presented a paper on "Reasons for Failures of Heating Systems," published on other pages of this issue.

Mr. Fleisher said the Government housing commission is now engaged in building thousands of workmen's homes, most of which are of a permanent character. The houses, as a rule, are heated by warm-air furnaces. He suggested that the recommendations contained in Professor Hoffman's paper be brought to the attention of the housing commission.

On motion it was voted to send copies of the paper to the Associated Press, American Press Association and to the leading dailies of the country. Mr. Lyle moved the appointment of a committee to edit the paper for general publication. This was later amended to include all the papers of the meeting suitable for general distribution. President Still appointed as a publicity committee for this purpose, A. S. Armagnac, chairman; Frank R. Chew and Professor J. D. Hoffman.

Mr. Chew suggested more activity by the chapters in getting local publicity for the Society's work. A statement that the fault often lies with the architect for poor structural conditions in connection with the installation of heating apparatus brought out a rejoinder from Mr. Collamore that the owner himself was more often the responsible party.

A paper was then presented on "A Campaign for Fuel Economy in House Heating," by C. W. Baker.

HEATING ENGINEERS AT BUFFALO CANOE CLUB, BUFFALO, N. Y. JUNE 27, 1913

A Campaign for Fuel Economy in House Heating.

Mr. Baker's principal recommendation referred to warm-air furnace heating. His suggestion was the addition of an auxiliary cold air duct by which the air supply to the furnace may be taken from inside the house, instead of from outdoors, during very cold or windy weather. Although there is nothing novel in this, he said that only occasionally are furnaces installed in this way.

He urged the heating profession to inaugurate a campaign to carry out this work on a large scale.

This was followed by a paper on "Economy in Heating," by Konrad Meier.

Economy in Heating.

Mr. Meier's observations were based partly on the conditions obtaining in such countries as Switzerland, where he is now located, where the standard indoor temperature is 64.4° F. The war regulations in effect last winter in Switzerland provided that such rooms should not be heated to over 60.8° F. and even this temperature, he said, "is now considered luxurious." For other rooms the standard has been reduced still further and the number of rooms that may be heated at all in one dwelling is restricted. The heating of halls and stairways is stopped altogether. Fall and winter vacations for school children have been extended. The saving of fuel through a general lowering of room temperatures by 5° F. may be about 20% to 25% of the normal consumption, an important factor being the reduced tendency to indraft and updraft. There would also be less dryness of the indoor air.

Intermittent heating was favored by the author with steam heat, although conditions must be considered in every case. The only question is whether fires should be banked at night or allowed to burn out. For outdoor temperatures down to 40° F. the latter has been found more advantageous and is now in fact made compulsory (in Switzerland). Wherever wood is obtainable for restarting the fires every day, it will probably pay to stop them over night in most of the steam plants of moderate size until freezing weather sets in, providing the plant is ample to allow reheating within a reasonable time. With hot water heat, interrupted service ordinarily will pay only in mild weather.

Mr. Meier urged the wider use of coke as a fuel in place of anthracite. When of good quality it gives little ash and clinker. Its principal disadvantage with boilers intended for coal lies in the bulk, which requires an ample fire box or more frequent charging. However, a deeper bed may be carried than with soft or hard coal. Coke, he said, may be mixed with anthracite or used alone in most boilers designed for the latter fuel.

Mr. Meier urged the control of the draft in a heater mainly through the ash-pit, as, with the usual check drafts, an excess of air is handled in the flue at the cost of additional heat expended. This, it will be noted, is at variance with the suggestion offered by Professor Breckenridge at the previous meeting of the society to "take off the ash-pit door or never use it."

Regarding the discussion as to the best location of a radiator in a room, Mr. Meier said that such tests should also establish the best place for the radiator in reference to the amount of heat required to secure comfortable conditions for particular parts of the room, for instance near windows. It might be found, for example, that the interior location of high radiators calls for decidedly more heat than low sin-

gle-column heating surfaces underneath the windows, because the former radiates less and heats more air, which rises to the ceiling and creates a current of cold air from the outside wall. The result is a cold floor and a ceiling, with considerable leakage overhead and indraft through doors and windows.

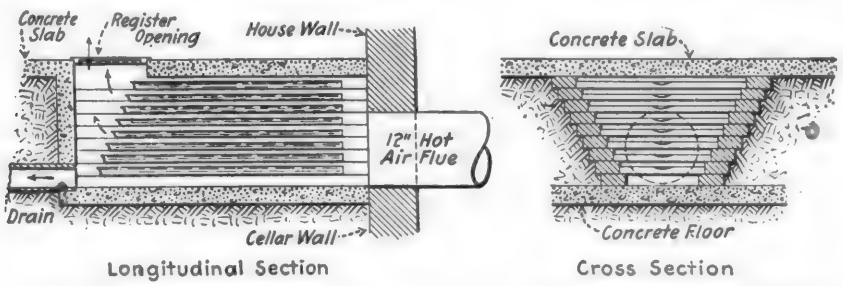
Mr. Meier also advocated better building construction and proper backing of radiators to prevent excessive heating of the walls behind.

A distinct disadvantage in discarding the ashpit door, it was pointed out, is the danger of causing gas to leak into the house when the fire is heavily checked by the smoke pipe dampers.

Mr. Carrier said that power plant practice offers the proper precedure to be followed. A balanced draft is the desired condition.

Reforms in the Design of Hot-Air Heating Plants.

In this paper the writer stated that he desired "to present reasons why, by the use of intelligent methods in the design of a hot-air furnace plant, it can be made not merely the equal, but the superior, of either steam or hot water heating for all buildings of moderate size." One of the first essentials, he said, to secure a uniform distribution to the different hot air flues is to reduce the resistance to the flow of cold air to the furnace. In his own house, the cold air inlet from the outside, as well as a cold air inlet from inside the house, has a cross-section equal to the combined area of all the hot-air flues. The two cold air ducts join to form one channel leading to the furnace. At the point of junction there is installed a wing damper, which is adjusted according to temperature and wind. A large check valve, consisting of a light wooden frame covered with cloth was hung in the inside cold air intake to prevent short-circuiting from outdoors.



ARRANGEMENT OF WATER PANS IN WARM-AIR OUTLET TO CONSERVATORY FOR MOISTENING AIR.

On the subject of warm-air heating, Mr. Chew proposed a committee to investigate the "pipeless" furnace and report to the Society on this type of heater. The matter was referred to the Society's furnace code committee with a request that a special report be made on it.

The final paper of this session was by C. W. Baker on "Reforms in the Design of Hot Air Heating Plants Needed to Compete with Other Systems."

A small plant-room heated by this furnace has a special system for moistening its air supply. This is accomplished by the use of shallow rectangular pans of galvanized iron, 1 in. deep, made to fit on shelves made by the brick lining. These pans are filled from the plant-room hose. The author also advocated the wider use of blower systems for warm-air furnace operation.

Morning Session, June 28.

The final session was devoted mainly to full conservation. A paper on "Spontaneous Combustion" by W. M. Franklin was read by the secretary.

Spontaneous Combustion.

The growing necessity for the storage of coal to cover the needs of the coming winter gave special timeliness to this paper, which was an exhaustive treatment of the general subject of spontaneous combustion. Mr. Franklin first took up the principles of combustion which he discussed in clearly-expressed terms, showing that the amount of burning, or oxidation, is proportional to the amount of the substance exposed to the oxygen, and also proportional to the temperature. The more fibrous or the more finely divided a material, the more surface will be exposed to oxidation and, consequently, the greater will be the danger of automatic burning.

For the prevention of spontaneous combustion, the enclosing of the combustible substances in air-tight fireproof cans or other containers will usually be effective. Another method is to lay the susceptible material in a thin layer freely exposed to the air so that all the heat generated will be carried away quickly and the temperature of the mass saved from rising at any time. This method of procedure is suitable only for such substances as coal and sawdust when plenty of room is available. Materials may also be soaked with water although this may not be effective where oil is present, as this prevents the water from touching the surface of the fibres and at the same time supplies the moisture necessary for the combustion.

This was followed by "Notes on Spontaneous Combustion of Coal" containing the text of a bulletin issued by the Bureau of Mines.

Notes on Spontaneous Combustion of Coal.

Small coal piles, it was pointed out by the Bureau, rarely ignite from spontaneous combustion, so that it is to be recommended that coal be stored in small quantities as near the point of consumption as possible. If large storage piles are necessary it should be borne in mind that generation of heat is the result of slow oxidiation of the coal surface and that such oxidization is much more rapid from freshly-mined coal or from freshly-broken surfaces. The oxidiation rate increases rapidly with increasing temperature, and different coals have different oxidiation rates. It is therefore recommended that:

Where there is choice of coal to be stored, that having the lowest oxidizing rate should be chosen, if known.

Between two coals, that which is least friable, and therefore which presents the least total coal surface in the pile, should be selected.

The method of handling should be such as to produce the least freshly broken coal surface.

The coal should be as cool as possible when piled. Piping warm coal on a hot day is more likely to produce spontaneous combustion.

The coal must be kept from any extraneous source of heat.

Alternate wetting and drying of coal during piling is to be avoided if possible.

The fine coal, or slack, which furnishes the larger coal surface in the pile, is the part from which spontaneous combustion is to be expected. Piling of lump coal where possible is therefore desirable.

In the process of handling, if the lump coal can be stored and the fine coal removed and used immediately, the practice prevents spontaneous combustion in coals which would have otherwise given trouble.

The sulphur content of coal is believed by many to play an important role in spontaneous combustion. The evidence on this point is still conflicting, but to play safe, it is desirable to choose coal having a lower sulphur content, when choice is possible.

There is a current belief that dissimilar coals stored in one pile are more liable to spontaneous combustion. The evidence on this point is also conflicting, but to play safe, it is advisable to store only one kind of coal in a pile.

The ground on which a coal pile is built should be dry.

In order to carry away the heat as rapidly as produced, the following recommendations are added:

Coal piles should be so made that there is a ready movement of air for ventilation throughout all parts of the pile, especially when made of coarse lump coal. The surfaces of coal piles should be so exposed as to allow the pile to cool, or else the coal should be so stored that air circulation within the pile is very small.

In making a coal pile of mixed sizes, the coal should be so handled as to make a homogenous pile and prevent the segregation of coarse and fine coal. This frequently determines the most desirable machinery for unloading coal.

It is common practice to limit the height of a coal pile, this for two reasons:—A pile too high crushes the lower layers of coal, producing more fires; the larger the pile the less heat-dissipating surface there is exposed in proportion to the heat generating capacity of the pile. Twelve feet in height is a common limit.

TEMPERATURES

Whatever precautions are taken in choice and handling of coal, provision should be made for keeping track of the temperature rise in a coal pile and for rapid re-handling of portions of a pile in case of excessive heating. In a coal pile covering a considerable area, it should be so subdivided that in case of spontaneous combustion of a portion, the heat will not be transmitted to the whole pile, thus accelerating the heating of portions of the pile which normally would have remained cool.

To keep track of the temperature of coal piles, it is recommended that ½-in. iron pipes be driven vertically into the pile at distances of 15 or 20 ft. apart. A maximum thermometer lowered into the pipe to varying depths will indicate the temperature of the pile opposite the thermometer.

A survey of the pile and a survey of the temperature of all parts of the pile should be made twice a week during the first three months after the pile is made, and once a week thereafter until the pile has evidently ceased to heat. As soon as any portion of the pile reaches a temperature of 150° F., provision should be made for removing that portion of the pile. Actual removal need not begin until the temperature has reached 180°, but at these temperatures the rate of oxidation is dangerously rapid. The object of re-handling the coal is to allow it to cool below a dangerous temperature. Any method of re-handling which does not allow of cooling will only transfer the difficulty from the old pile to the new one. It is usually useless to employ water in an attempt to cool a coal pile.

Lack of provision for rapid reloading, cooling, and repiling of coal is the cause of serious loss from spontaneous combustion.

The heating of the base hospital at Camp Dodge was described in a paper by P. M. McConnell.

Heating the Base Hospital at Camp Dodge.

Camp Dodge, located near Des Moines, Ia., has a base hospital consisting originally of 40 buildings with a capacity of 500 beds. This capacity was found to be too small and it was enlarged to 2000 beds, requiring 71 buildings. The plans also provide for a future extension of 500 beds. Mr. O'Connell's paper gave a general description of the buildings and their equipment which includes 70,400 sq. ft. in the original hospital and 75,000 sq. ft. of radiation in the extension. High-pressure steam is used in the laundry, main kitchen and all diet kitchens, and also for heating all hot water. Numerous illustrations bring out the interesting details of the installation.

In the original scheme a steam pressure of 80 lbs. was carried on the main header from the boilers. A connection was then made to a 10-lb. low pressure header through a reducing valve. When the additional buildings were added and the boiler capacity increased, the reducing valve was removed as the additional load made it necessary to carry boiler pressure on all heating mains to the distributing points.

At various manholes, all steam lines connect into high-pressure headers which connect to intermediate distributing headers through reducing valves. In addition each building has a separate reducing valve for controlling the local pressure.

The return mains are run underground in tile conduits to the boiler house.

Suggestions prepared by the American Red Cross through D. C. McMurtrie, were incorporated in the last paper on "Duty of the Employer in the Reconstruction of the Crippled Soldier."

The Duty of the Employer in the Reconstruction of the Crippled Soldier.

This paper, which was one sent out for general distribution by the American Red Cross, emphasizes the fact that the only sound method of dealing with the crippled soldier or civilian is to train him for a trade in which the physical disability does not incapacitate him. In this country the Government will provide the necessary medical treatment, supply artificial limbs, conduct the training for an occupation, and find the job. It rests with the people, however, as to whether they will encourage the returned soldier to accept the advantages of training which will refit him for a life of usefulness and self-respect.

We must count on the return from the front of thousands of crippled soldiers, said Mr. McMurtrie. Industrial schools are now in operation by the hundreds in France, Italy, Germany, Great Britain and Canada.

Among the points brought out was that the education of the adult is made up largely of his working experience. The ground work of training in his past occupation must under no circumstances be abandoned.

The positive aspect of the employer's duty is to find for the disabled man a constructive job which he can hold on the basis of competency alone. Employers are urged, therefore:

To study the jobs under his jurisdiction to determine what ones might be satisfactorily held by cripples;

To give the cripples preference for these jobs;

To consider thoughtfully the applications of disabled men for employment, bearing in mind the importance of utilizing to as great an extent as possible labor which would otherwise be unproductive;

To do the returned soldier the honor of offering him real employment, rather than proffering him the ignominy of a charity job.

If the employer will do this, it will be a great factor in making the complete elimination of the dependent cripple a real and inspiring possibility.

Under topical discussion the subject of "Fuel Consumption Required for Operation of Air Washers" was taken up and the importance of humidity control emphasized. It was stated that some of the State fuel administrations are urging the cutting out of air washers on the ground that their use adds 50% to the fuel consumption in buildings where they are installed.

An invitation was presented from the Buffalo Academy of Medicine to send representatives of the Society to a meeting to be held that evening. A committee was named consisting of F. R. Still, Frank H. Chew and A. S. Armagnac, all of whom spoke later at the Academy of Medicine on the general subject of the relation of the medical profession to the work of the heating engineer.

R. C. Collamore presented a verbal report of the discussion on fuel conservation at the recent summer meeting of the American Society of Mechanical Engineers in Worcester, Mass. An item of information brought out at that meeting was that coal operators are to be penalized for delivering inferior grades of coal. Lack of time, he said, prevented a discussion of all the topics at that session.

The meeting then adjourned.

The Entertainment.

Under the leadership of C. A. Booth, general sales manager of the Buffalo Forge Company, a well-arranged programme was carried out. Following a matinee on Wednesday afternoon for the ladies, a reception and dinner, dance for members and guests was held in the ball room of the Hotel Statler. This attracted a large attendance, one of the features being a dancing competition in which the honors went to L. C. Soule and partner.

Thursday afternoon the entire convention party were taken on the steamer Americana across Lake Erie to the Buffalo Canoe Club at Abino Bay. After a professional session in the boathouse, the men rejoined the ladies and spent the time intervening before dinner in a remarkable game of one-old-cat on the beach.

The dinner that followed in the main club house was done full justice to, and the reputation of the Buffalo Canoe Club for good cooking more firmly established than ever.

The day seemed made for the occasion and after the dinner an hour of sheer enjoyment was spent on the clubhouse lawn and in walks along the beach. There was dancing later on the pier in which many participated.

Friday morning the ladies went by automobile to Niagara Falls where they had luncheon and later took the Gorge trip. Friday afternoon the men visited the plants of the Buffalo Forge Company and the American Radiator Company.

Included on the entertainment committee, which was given a special vote of thanks by the Society before adjournment for the success of its efforts, were C. A. Booth, chairman; J. A. Bendure, E. W. Case, W. G. Fraser, L. A. Harding, L. C. Soule and H. W. Wendt.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Annual Meeting of Michigan Chapter.

Captain Charles A. Ammerman of Camp Custer was the principal speaker at the annual meeting of the Michigan Chapter, held in Detroit, May 25. He described in detail the heating system at Camp Custer. President Frederick R. Still, of the heating engineers' society, also spoke.

New officers were elected as follows: President, J. R. McColl. vice-president, W. P. Verner; secretary, William F. McDonald; treasurer, H. A. Hamlin. Board of governors: James E. Degan, Thurlow E. Coon and Edwin L. Downs.

Building permits for May, 1918, showed a smaller loss than for any previous month this year, as compared with the same period in 1918. The totals operations in 116 cities, as compiled by the *American Contractor*, Chicago, was $49,941,778, as compared with $75,543,888 in May, 1917.

NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS

WHO HELPS ME I HELP

Twentieth Annual Convention, Chicago, June 3-5, 1918

Acting on a suggestion made at its last convention in Atlantic City, in 1916, the National Association of Master Steam and Hot Water Fitters has taken the important step of changing its name. According to a resolution passed at its recent annual convention in Chicago June 3-5, the organization will hence-forth be known as the Heating and Piping Contractors' National Association.

EDMUND GRASSLER,
President Heating and Piping Contractors' National Association.

Patriotism was a dominant note at the convention, the flags of the Allies being prominently displayed in the convention hall, alongside the Stars and Stripes. At the same time a most serious matter in connection with Government work was taken up and frankly discussed. This was the practice of the Government in demanding that the general contractor shall himself construct all branches of the work, while in some cases the Government is hiring labor direct and executing the contracts itself. This practice, it was contended, deprives the heating contracting trade "not only of our means of existence, but has endangered our entire organization.

Competition and co-operation came in for their usual thorough discussion. As one step towards stifling unreasonable competition it was urged that the trade adopt the "open price" method of bidding whereby the bids of the contractors, after being submitted to the owner, general contractor, or architect, as the case may be, become known to every competing contractor. Further progress was also made in the development of a standard accounting system so that a clearer idea would be had of what constitutes "overhead expense," one of the advantages being that such "overhead" would be based on the same series of items. As President Almirall pointed out, "it will not do for one concern to place, say, his liability insurance as part of his overhead and another contractor to put that same item as part of his cost."

The possibility of the heating business being considered by the Government as one of the non-essential industries was brought up and the opinion was expressed that every care should be taken by the Government to prevent any serious curtailment of this industry. "The war will end some day," said

President Almirall, in his address, "and industrial enterprises will again become normal. When it does, these concerns will be needed and if, in the interval, they have been forced out of business, it will be a difficult matter to resume without very great loss." He proposed that, if necessary, the Government utilize such plants or "guarantee them a minimum return on their capital."

Monday, June 3, was taken up with meetings of the board of directors and of special committees at convention headquarters in the Hotel Sherman. In the evening the "Old Guard" consisting of the past and present officers and directors of the association, met in the hotel. There was a note of sadness in the re-union this year, as the "Old Guard" has lost no less than three of its members since its last meeting, including the late Alfred E. Kenrick, Paul H. Kendricken and John T. Sadler. A letter was received from W. G. LeCompte, who has for years been in charge of the entertainment features at the convention, and who is now on active military duty at the front.

President Juan A. Almirall called the convention proper to order Tuesday morning, June 4. He was given a rousing reception. After the singing of "America," President Almirall delivered his address. The principal topic discussed by Mr. Almirall was the attitude of the Government in dealing with the general contractor in its vast building programme as well as undertaking the role of contractor itself.

GOVERNMENT ACTING AS CONTRACTOR FOR BUILDING WORK.

"Recently," he stated, "some of the Government's departments have adopted a practice which, if continued, may have the most serious consequences to our trade. Not only have these departments demanded that the general contractor shall, himself, construct all branches of the work, but in several cases the Government has actually hired labor direct, employed a mechanical superintendent, and executed these contracts, thus depriving us, not only of our means of existence, but has endangered our entire organization. Such action is not defensible from either a practical or economic standpoint.

"Existing organizations, with their knowledge of the details of the business and with highly trained men in their employ, are undoubtedly in a position to design and construct such work in our trade as the Government requires, much more economically and perfectly, than a new organization just brought together.

"The knowledge that the Government is about to launch another large construction program, has made the situation so critical that the association has presented the whole subject to the Chamber of Commerce of the United States, of which it is a member.

"In a further effort to prove that a continuance of such a policy would threaten ruin to a trade representing an investment of many millions of dollars, Messrs. Rutzler and Almirall and Secretary Gombers appeared on May 10 by appointment before the board of directors of the Chamber of Commerce in Washington and submitted a brief which stated our case in detail, and asked their assistance in presenting this matter before the proper Government department heads in Washington.

"This matter is of such paramount importance that it is more than probable additional steps will have to be taken not only by our trade, but by the entire building industry in order to convince the proper authorities of the wisdom and advisability of availing themselves of the ability, talent, and assistance of existing organizations and of the great harm which would assuredly follow their neglect."

STATUS OF THE HEATING INDUSTRY IN WAR TIMES.

Speaking of the heating contracting

business generally, President Almirall said:

"We submitted uncomplainingly to the restrictions and regulations of the Government experts, even when we felt at times they were in the nature of an experiment. We have also been willing and eager to give these experts the benefit of our experience and advice, and when our leading men were asked to leave their businesses and devote themselves entirely to Government work, they did so with the greatest cheerfulness and promptitude.

"We have only begun, however, and greater results have yet to be accomplished, for we fully understand that all business now is Government business. In the stress and strain of the effort to win the war, however, caution should be observed by the administration in regarding certain forms of industry as non-essentials and in putting too great restrictions upon them so that they become discouraged and cease to manufacture. For the war will end some day and industrial enterprise will again become normal. When it does, these concerns will be needed, and if, in the interval, they have been forced out of business, it will be a difficult matter to resume without very great loss. Rather than force such a situation as this it would be well to try to utilize their plants for Government work or guarantee to them a minimum return on their capital. The laws of the different States all led them to capitalize, build, and manufacture; guaranteed them protection as long as they obeyed the law and so in all fairness the Government should not summarily suppress them.

"This is peculiarly true in our own particular trade where the largely increased cost of all material, the difficulty of transportation, the scarcity of labor, and the lack of money for fixed investments has brought nearly all private and municipal work to a complete standstill.

"This means that the private residences and the mercantile buildings, the construction of which is the 'bread and butter' of our business, has been practically abandoned and been replaced by Government war work, mainly in factories, warehouses, and housing schemes. The great difficulty is that the Government has assigned its work to restricted areas, thus giving opportunities for construction work to relatively smaller numbers of our members. This condition is a difficult one for our trade to meet and it is unfortunate that the Government although without wilful intent, is increasing rather than lessening our problems.

"A formal communication addressed to the chairman of the Committee on Emergency Construction, which was then acting in an advisory capacity to the War Department in connection with the construction of new army cantonments, was presented by a special committee from your board of directors, consisting of Messrs. Danforth, Oakes, and Almirall, who went to Washington in June, 1917, offering the services of our national association and forcefully urging upon them the desirability of segregating the contracts for the mechanical equipment and awarding them directly by the proper departments.

"Our communication was not acted upon, although the heating appartus for a number of the national war and navy cantonments and other war construction has since been furnished and erected by members of our national association, as sub-contractors to a general contractor, and many on a cost plus percentage basis."

President Almirall spoke feelingly of the deaths of Alfred E. Kenrick, Paul H. Kendricken, John T. Sadler and George H. Zellers, all of whom had died since the previous convention in 1916. Still another figure prominently identified with the association, although not directly connected with it, was the late Alfred B. Jenkins, whom President Almirall described as one of the association's most loyal supporters.

The return of the Chicago local as-

sociation to membership in the national association was announced, President Almirall calling attention to the fact that the Chicago association was the nucleus of the national organization in 1889 and that it was in Chicago that the convention first met. Eleven years later the Chicago local association left the national body, so that its readmission to membership at this time marks an important turning point in the history of the association.

Finally, President Almirall referred to the many members of the association who are on war service. "We reverently ask Gods' loving protection for them," he said, "but if it becomes necessary at the next convention to read the names of any as having made the supreme sacrifice, we may rest assured that they will have died bravely, facing the foe in the cause of freedom, democracy and righteousness."

Special attention was called by the president to the proposed "Standardized Accounting System," that was submitted to the convention at a later session by the Committee on Standardization.

As a step towards closer co-operation in the trade and a restriction of the evils of competition, Mr. Almirall proposed the adoption of what is known as "open-price" trade agreements, whereby the bids of members, after being submitted to the owner, general contractor, or architect, as the case may be, become known to every competing member. Many such associations are in existence today, he stated, in the building trade and their members are reaping large financial benefits.

OTHER SPEAKERS

Harry A. Wheeler, president of the United States Chamber of Commerce, who was on the programme for an address on "Organization of Industry for War," could not be present owing to illness, but the address was delivered very convincingly by his assistant, John N. De Vries, general secretary of the chamber. Mr. De Vries gave an account of the valuable work being done by the United States Chamber of Commerce and presented to the convention many facts and figures bearing on the accomplished results of the war service committees. He laid particular stress on the possibilities of conserving the nation's resources by a study of the needs of the various industries. He outlined the great value of elimination in many fields by standardizing methods of manufacture, applying the principles to shapes, sizes and colors of manufactured products.

C. V. Kellogg, president of the Kellogg-Mackay Co., then addressed the convention on the vital necessity of devoting all our energies to the winning of the war and safeguarding every present and future activity of the nation. He gave an outline of the work of the Trade Extension Committee for "Building Bigger Business" through new equipment in old buildings, and urged the members of the convention to further the campaign.

Louis Bruch, vice-president of the American Radiator Company, also addressed the convention on the Trade Extension Committee's campaign and gave details of the methods being used to further its work, explaining how the individual contractor may participate in the movement.

COMMITTEE APPOINTMENTS

At the opening of the afternoon session the following committee appointments were announced:

CREDENTIAL—J. Henry Howe, New York; F. E. Wheeler, Maine; F. S. Spencer, Minnesota; Fred W. Kaufman, Wisconsin; G. F. Ahrens, Iowa.

APPEALS AND GRIEVANCES—Harry G. Black, Pennsylvania; B. MacKenzie, North Carolina; A. Kilander, Illinois.

RESOLUTIONS—J. J. Herlihy, Illinois; Huga Urbauer, Missouri; John A. Creelman, New York; J. J. Collins, Missouri.

NOMINATING—Joseph G. Geoghegan, New York; Frank H. Meadows, Wisconsin; Robert S. Parks, Massachusetts; J. F. Gunn, Missouri; W. B. Van Sickle, Ohio.

AUDITING—S. A. Jellett, Pennsylvania; F. W. Howard, Massachusetts; William H. Curtin, New York.

CONSTITUTION AND RULES FOR CONVENTION PROCEDURE—J. E. Rutzler, New York; William H. Oakes, Massachusetts; George L. Bradbury, Colorado; N. F. Hughes Pennsylvania.

ASSOCIATION IMPROVEMENT—E. T. Child, New York; H. A. Snow, Massachusetts; E. J. Claffey, Illinois.

DISTRIBUTION OF REPORTS—S. A. Jellett, Pennsylvania; J. T. Dyas, New York; E. P. Ambler, Missouri.

The convention then went into executive session, at which were presented reports of the board of directors, Treasurer J. E. Rutzler and Secretary Henry B. Gombers, as well as the reports of committees and State and local associations.

It was at this session that the proposal was made to change the name of the organization to the "Heating and Piping Contractors National Association." The proposal was adopted with enthusiasm and it was recommended that all State and local associations be urged to adopt the new title. It will go into effect at once with the national association.

War matters came to the front again with the introduction of Lieutenant R. A. Bowlby, of the Canadian forces, who spoke at the request of the United States Shipping Board. He urged the great necessity of every one's doing his utmost to help speed up the production of ships. The remainder of the afternoon session was given over to an illustrated talk on "Cost Accounting," which served to emphasize the president's appeal for a standardized accounting system throughout the heating trade.

NEW OFFICERS

The convention again went into executive session Wednesday morning. In the afternoon announcement was made of the election of the following officers:

President, Edmund Grassler, Milwaukee, Wis.

Vice-President, W. H. Oakes, Boston.

Treasurer, J. E. Rutzler, New York.

Board of Directors: Harry Black, Philadelphia; E. T. Child, New York; N. L. Danforth, Buffalo; G. N. Getschow, Chicago; Joseph F. Gunn, St. Louis; W. B. Van Sickle, Cleveland; Edmund Grassler, Milwaukee; W. H. Oakes, Boston; and J. E. Rutzler, New York. At a later meeting of the new board of directors, Henry B. Gombers was re-elected secretary.

Past President Elias D. Smith officiated at the installation ceremonies, as in former years, and the new officers were given a hearty welcome by the members.

Resolutions were adopted pledging the association anew to the support of the government and also in appreciation of the members and members of their families engaged in government service. Resolutions of thanks were also given to the trade press, to the various speakers at the convention and to the ladies present.

Secretary Gombers announced that a telegram had been sent to Mrs. John T. Sadler, extending the condolences of the members upon the death of Colonel Sadler who died at his home in Elmira, N. Y., May 14th. The good wishes of the convention were also telegraphed to Sergeant-At-Arms John C. F. Trachsel, for his complete and early recovery.

The speaker of the afternoon was Edgar A. Bancroft, general counsel of the International Harvester Company, whose subject was "Business in War Time." Mr. Bancroft asked that everything in our lives, business and social, be dedicated to the supreme task of stamping out the false doctrine of the Hun, who is attempting to ride over the world's conception of honor, decency and law. Mr. Bancroft was given an ovation on the completion of his address. The convention then adjourned.

Entertainment

The principal entertainment at the

convention was a supper and dance in the Crystal Room of the Hotel Sherman on Tuesday evening, June 4. Members and guests numbering over a hundred were present. The supper was accompanied by entertainment features and this was followed by dancing which continued until a late hour.

On Tuesday afternoon the ladies were entertained at the Majestic Theatre and on Wednesday were taken on a delightful ride by automobile through Chicago's parks.

Convention Notes.

Chicago was represented at the convention by practically all the principal contractors and manufacturers of heating apparatus located in that city as well by representatives of out-of-town firms.

The delegation from the East included J. A. Almirall, New York; J. E. Rutzler, New York; Wm. H. Oakes, Boston; N. P. Bishop, New Haven; W. L. Danforth, Buffalo; Harry G. Black, Philadelphia; E. T. Child, New York; J. G. Geoghegan, New York; Elias D. Smith, New York; Stewart A. Jellett, Philadelphia; John A. Creelman, Rochester; J. Brandeles, Utica; W. H. Curtin, Brooklyn; F. E. Wheeler, Portland, Me.; Robert B. Miller, New York; L. W. Butterfield, Orange, N. J.; E. C. Butterfield, Brooklyn; Wm. J. Olvany, New York; G. E. Tauberg, New York; Henry B. Gombers, New York; Arthur Ritter, New York; Homer Addams, New York; B. K. Strader, New York.

Among the others present were noticed: J. F. Bradley, St. Louis; E. Grassler, Milwaukee; F. H. Meadows, Milwaukee; P. F. Maginn and W. S. McGinness of Pittsburgh; J. H. Howe, Rochester, N. Y.; J. A. Ziesse, Grand Rapids, Mich.; George L. Bradbury, Denver; W. C. Weatherly, Grand Rapids, Mich.; Otto Biefeld, Watertown, Wis.; and Jesse Coogan, Salt Lake City.

Nearly 250 members and guests signed the convention register.

Trade Extension Work the Keynote at Annual Convention of National Association of Master Plumbers.

An unusually large attendance marked the thirty-sixth annual convention of the National Association of Master Plumbers, which was held in St. Louis, June 4-6. Nearly 1000 persons participated in the parade to the convention hall. In his report President L. McNamara gave some interesting details of the development of the trade extension movement. This started with a series of resolutions which have now become the programme for the "Building Bigger Business" campaign. It was adopted at a joint meeting of the members of the Master Plumbers' Association and the Manufacturers' and Jobbers' Associations, held in Chicago, February 22. The principal recommendations were:

"Whereas: In these times of national stress, it is more necessary than ever that the various interests constituting our industry should co-operate closely—become partners, in word and fact. Be it therefore

"Recommended: That the trade, and jobbers and manufacturers in the heating and plumbing industries should unite in adopting and encouraging keen, timely and uniform plans and practices of conducting promotion and publicity campaigns, which shall teach the public conservation, sanitation and wise investment, by means of the workmanship and materials which we collectively offer. Be it further

"Recommended: That members of the trade, jobbers and manufacturers should each carefully study his or their present advertising so that instead of the commonplace advertisements, which read like business cards, there may be substituted illustrations and text which shall give the public the most forceful, modern business messages of the conservation, sanitation, and prudent investment. The heating and the plumbing industries are so essential to comfort, health protection, domestic labor-saving, and large and enduring ecomony, that it is our patriotic and business duty to let the people know these facts, through especially prepared, electrotyped advertisements, show-window trimmings, window transparents, movie slides, street-car cards, bill-boards, circular letters, exhibits at annual national conventions, and other aids.

"Recommended: That where jobbers or manufacturers maintain public display rooms, and submit estimates of retail prices on their fixtures, and make no sales except through the trade that all such estimates, in order not to be misleading to the consumer, should carry a reasonable differential to the trade over and above the cost of doing business. And such estimates should be upon fixtures and ap-

pliances only, and in no case cover any part of estimating the cost by the trade, of the plumbing, roughing-in material, or labor of installation. And be it further

"Recommended: Where there is more than one member of the trade in a town, honest effort should be made by the jobbers or manufacturers to learn from the consumer the name of the member or members of the trade who may have previously done his or her work; and by first referring such inquiries, arising from advertising by the manufacturers or jobbers, to the member or members of the trade so named or nominated by the consumer, facilitate such prospective business; and inquiries arising from circularizing, the lists to be furnished by the trade, should be directly and solely referred to the member of the trade furnishing the list of such prospect or customer. And be it further

"Recommended: That the trade should co-operate in the publicity campaigns conducted in their respective localities by jobbers and manufacturers through endeavoring to canvass names of all farm and city building-owners whom the trade believe are fair prospects for the sale of modern forms of heating, plumbing, water supply, and vacuum cleaning devices. Such canvass of names to be made through calls from door to door, or by canvassing over the telephone, or by drawing off names from ledger, or from job ticket reports, etc., etc.

"Copy of such list of building-owner names to be sent only to a single jobber or manufacturer for circularizing—to save waste and duplication of advertising and postage, and also to avoid annoying property-owner with excess mail on the same general subject.

"All lists sent in to be marked specifically as to kind of article or merchandise, for which it is believed sale can be influenced or made.

"In furnishing names of prospective consumers the trade should carefully give correctly the names, initials, street and number (or rural route number) town, county and state.

"Resolved: That the manufacturers and jobbers in all of their future publicity cease referring to the heating contractor as a fitter and to the plumbing contractor as a plumber, and in all future publicity so word such publicity as to elevate the position of the plumbing and heating contractor."

The question of having a "business doctor" was given special attention at one of the Trade Extension Committee meetings, and as a result William J. Woolley, of Evansville, Ind., was engaged to make studies of the subjects of estimating, costs, installations, credits, accounting, sales, display rooms, advertising and other promotions.

The campaign for "Building Bigger Business," now being conducted in the trade press, is being handled through Mr. Woolley.

A contest arose over the presidency of the association for the ensuing year, the nominees being President McNamara and Vice-President Frank B. Lasette. The results of the ballots showed Mr. McNamara to have 160 votes and Mr. Lasette, 125. Mr. Lasette was later re-elected vice-president.

A remarkable display of plumbing goods and specialties occupied two floors of the convention hall.

Current Heating and Ventilating Literature.

Under this heading is published each month an index to the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the article mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

HEATING DWELLINGS

How 20 Per Cent. of the Cost of Heating Buildings Can Be Saved. 800 w. Eng & Con—March 27, 1918. Suggestions sent by the Colo. State Council of Defense to householders for the proper use of coal. 20c.

ISOLATED PLANTS

Isolated Plant for Chemical Factory. Ills. 1500 w. Pwr Pt Eng—April 15, 1918. Steel encased boilers, underfeed stokers and four-valve engines make for efficiency. 20c.

Piping for Steam-Generating Plants.

PIPING

2500 w. Pwr Pt Eng—April 15, 1918. Installation and operation from safety viewpoint. 20c.

STEAM MAINS

Underground Steam Mains. Charles L. Hubbard, Ills. 2200 w. Power—April 2, 1918. Serial. 1st part. Need of care in construction as they are less accessible. 20c.

The Progress of Gas House-Heating.

A committee of the American Gas Institute has recently completed its report for 1917 on the progress made in the design of gas heating appliances and methods of installation in residences. The report is devoted mostly to illustrations and descriptions of representative house-heating appliances now in use, especially the larger types. Natural gas appliances are included, as well as those designed for burning manufactured gas. This was done because in many cases the manufactured-gas appliances are simply modifications of those designed for natural gas.

It is to be noted in the report that few gas appliances have been exhibited in combination with coal heaters. Practically all of the straight gas appliances, however, are adapted to auxiliary heating.

Regarding the use of coal furnaces equipped with gas burners that are a permanent part of the heater and are placed in the coal fire-box, permitting the furnace to be used with either coal or gas, as may be desired, the committee states that while reports on some coal-fired furnaces of this type seem to indicate that satisfactory results are being obtained, the committee, nevertheless, is of the opinion that, as a class, these appliances do not work out successfully when using gas, because of the somewhat lessened efficiency due to the clogging of the burners by coal-dust, ashes, etc., and the partial burning out of the burners from the heat of the coal fire.

The appliances are classified as central units and as individual room heaters. Separate sections are devoted to thermostatic controls and to formulas in use for determining radiation and gas consumption required for heating buildings.

Two radiation formulas are given, the first being as follows:

$$\frac{72\,G + 22\,W + 1\tfrac{1}{2}\,A}{240} = \text{Steam radiation in square feet.}$$

$$\frac{72\,G + 22\,W + 1\tfrac{1}{2}\,A}{150} = \text{Water radiation in square feet.}$$

where G = exposed glass in square feet.
W = exposed wall in squaare feet.
A = volume of air to be heated.

The second formula applies to ordinary residences and is simplified, "because residences are quite similar in general construction and use." This formula gives the number of B. T. U. required to maintain a constant temperature of 70° F. when the outside temperature is 0° F.:

(a) Square feet of window and outside doors multiplied by 72.

plus (b) Square feet of outside walls multiplied by 22.

plus (c) Contents in cubic feet multiplied by 1.4 equals (d) Number of B. T. U.

Note. Exposure factors. Windows and door surface (a) and wall surface (b) should be increased as follows:

North exposure, add 32%.
East exposure, add 12%.
West exposure, add 20%.

For each degree difference more or less than 70°, add or substract the proportionate number of B. T. U. required for 70° difference.

COMPUTATION OF GAS CONSUMPTION.

Having determined the heat loss in B. T. U. by means of the formulas, the consumption must be increased in pro- required to maintain the desired temperature is found by dividing the heat loss in B. T. U. by the thermal value of the gas in B. T. U. In an example, the thermal value of the gas is given as 550 B. T. U. per cubic foot. This consumption holds for a gas appliance operating at 100% efficiency. For any other efficiency the consumption of gas in cubic feet per hour portion.

In the section devoted to straight (central unit) gas appliances 13 types hot are shown for use with hot-air heaters, seven for steam heaters and eight for hot water. Combination coal and gas appliances include five makes for hot air and two for hot water. One interchangeable coal and gas appliance is shown and two for hot water and steam. The burners for converting coal heaters to gas number six types. Special attention is called to the desirability of making use of firebrick, suitably disposed around and above the burners, to obtain the best results.

Deaths.

Edward Clarence Meier, president of the Heine Safety Boiler Co., St. Louis, Mo., died suddenly while in attendance at a meeting of the District Production Division of the Emergency Fleet Corporation in Philadelphia, May 7. He had just completed a short address giving some of his views regarding the speeding up on the construction of boilers. Mr. Meier had worked in all departments of the company and was an expert on boiler construction.

CORRESPONDENCE

Duration in Hours of Varying Outdoor Temperatures.

EDITOR HEATING AND VENTILATING MAGAZINE:

In making calculations of steam and fuel consumption in heating plans, the number of hours in each 10° temperature during the heating season is needed and in order to obtain this information I wrote to the Weather Bureau at Washington, D. C. as follows:

"In making certain heating calculations particularly for the latitude of Boston or New York, but frequently for other parts of the country, I am desirous of obtaining United States weather reports or other publications that will give me the number of hours in the heating season for a given temperature.

"For instance, assuming the heating season to begin with September 15 and ending with May 15, I wish to ascertain if possible, the number of hours within that season within the following range:

From —20° to —10° F.
From —10° to 0° F.
From 0° to 10° F.
From 10° to 20° F. and so on up to 70° as a maximum

"I frequently see references to weather reports which would indicate that such information is available. If so, can you supply me with the data?"

In reply the Weather Bureau states that this information is available if one wishes to pay the bureau for taking off for a given number of years in order to obtain an average. This, of course, is rather expensive, but as I frequently see computations of heating requirements made up in that way, I assume that some one has already had this work done.

Can you inform me from your acquaintance with either the technical schools, or any other authorities, where I can obtain this information in the form desired?

Boston, Mass. A. S. K.

It is questionable if such information is very valuable for the purpose to which our correspondent intends to apply it. While there may be a few buildings which are held strictly up to proper temperature during both day and night for seven days a week during the entire heating season, this is not common or even frequent practice. Most buildings have the heat off from 10 or 11 o'clock at night until 5 or 6 o'clock the following morning—such as institutions, hotels, etc., when the structures are occupied 24 hours per day. For office buildings, manufacturing and business blocks, the heat is seldom kept up after 6:00 P. M. or on Sundays; for schools, colleges, and other places of instruction, etc., heat may be shut off even earlier and on both Saturdays and Sundays.

Neither would it be fair to reduce the outside temperature hours in proportion to the number of hours heat is kept on for the time when the heating system is not in operation is during the coldest hours—viz:—from late at night to early morning. Also when starting to warm up in the morning a much heavier load must be carried for a short time (in order to bring the building up to temperature) than the state of the outside temperature would indicate.

In the vicinity named by our correspondent we believe a much more practical figure—and probably a more accurate factor than can be obtained by the method proposed—is to allow 100 lbs. of coal per square foot of equivalent direct radiation per season.

In a recent publication, however, we note a discussion of another subject in which the number of heating hours per year is given and we quote these here.

Number of Hours.	Temperature, Deg. F.
308	0 to 10
817	10 to 20
1142	20 to 30
1120	30 to 40
912	40 to 50
746	50 to 60
787	60 to 70
Total 5832	

It must be remembered that every hour when it is 60° outside does not require artificial heat and a great many hours when it is between even 50° and 60° will occur during cool nights when the days are at a perfectly comfortable temperature.

Ordinarily the heating season in the latitude of New York is presumed to cover about 200 heating days and, if heat is kept on the building for an average of 18 hours per day—which is an unusually high average—the total heating hours per season would be 3600 against the 5832 hours called for in the above. We suppose the above table is accurate but cannot give its source beyond the statement that it is

based on "records of the Weather Bureau" nor can we guarantee its accuracy.

Interpretation of "Adequate Ventilation."

EDITOR HEATING AND VENTILATING MAGAZINE:

I find on Page 39 of THE HEATING AND VENTILATING MAGAZINE for May a short article entitled, "New York Board of Health Interprets Adequate Ventilation." It is gratifying to note that the importance of establishing some definite standards is being recognized, but I feel that this interpretation is open to criticism in certain particulars:

1.—*Temperature*: A temperature range from 60 to 70° F. is proper provided the humidity is maintained at a desirable point. A temperature of 60° requires a humidity of about 77% for comfort, but a temperature of 70° with this same humidity is extremely uncomfortable. The point I wish to make is that the dry-bulb temperature is not a satisfactory standard in itself, as the air moisture content has a very important bearing on the question. A satisfactory wet-bulb standard can be determined but this is not true of the dry bulb.

2.—*Humidity*: I find the statement under "Humidity" that the relative humidity in occupied rooms should not exceed 70%. This is, of course, true but a fixed maximum cannot be set. A dry bulb of 70° and a relative humidity of 70% would comply with these requirements, but the condition would be extremely uncomfortable. I find further the statement that the wet bulb should not exceed 78°. This, in my opinion, is entirely too high and it is questionable if the wet bulb should ever be allowed to exceed 60°.

3.—*Carbon Dioxide*: This is a satisfactory standard and requires no comment.

4.—*Dust*: The maximum standard for dust particles is given as 1,000,000 per cubic foot, or, by weight, 4 milligrams per 100 cu. ft. I fail to understand how there can be a very close relation between the count of dust particles and the weight in a given volume of air, as the character of the dust varies so widely in different places. Furthermore, when we consider dust particles existing in sizes so small that they cannot be seen even with the highest-powered microscope in more or less uniform gradations up to a size that can be easily seen with the naked eye, I feel that it is essential that a standard be set limiting the range of particles under consideration. We count the dust particles visible with a magnification of 50 diameters and allow 5,000 per cubic foot as a maximum in a well-ventilated room.

5.—*Bacteria*: The number of bacteria obtained by test will depend on the method used for making the determination.

6.—*Odors*: While it is true that it is desirable to have rooms entirely free from objectionable odors, still, as a matter of fact, this is impossible to attain. I have never found even a well-ventilated school class room, for instance, entirely free from odors.

E. V. HILL,
Ventilating Inspector in Charge.
Chicago, June, 1918.

Comparative Tests in New York School Buildings With Mechanical and Natural Ventilating Systems.

A criticism of the present ventilating system in use in the public schools as inferior to the old-fashioned method of opening a window is contained in a bulletin of the Health Department of New York, just issued, which refers to the air which school children now have to breathe as "canned."

The criticism is based on a study which was made in co-operation with the New York State Commission on Ventilation of seventy-six classrooms in thirteen different schools; 5553 children were in the groups studied. The tests were carried on for five months in half of the rooms the windows were kept closed and the patent ventilating system was depended upon. In the other half the ventilating system was shut off and windows were opened. The results are set forth as follows:

"In the closed window, mechanically ventilated type of classroom kept at a temperature of about 68° F., the rate of absences from respiratory diseases was 32% higher than in the open window, naturally ventilated type of classroom kept at the same temperature, and about 40% higher than in the open window, naturally ventilated type of classroom kept at a temperature of about 50° F. In other words, the children in classrooms with closed windows and ventilated by mechanical methods were more subject to respiratory diseases, severe enough to keep them from school attendance, than were children who were in classrooms kept at the same or lower temperature and ventilated wholly by open windows. In the closed window, mechanically ventilated type of classroom kept at a temperature of about 68° F. the rate of respiratory diseases occurring among pupils in attendance was

98% higher than in the open window, naturally ventilated type of classroom kept at the same temperature, and about 70% higher than in the open window, naturally ventilated type of classroom, kept at a temperature of about 50°. In other words, the children in classrooms with closed windows and ventilated by mechanical methods were more subject to respiratory diseases not sufficiently severe to keep them from school attendance than were children who were in classrooms kept at the same or lower temperature and ventilated wholly by open windows."

The War and the Heating Engineer

Suggestions for Selecting, Storing and Using Coal.

Suggestions intended for householders for selecting, storing and using coal in house-heating equipment have been prepared by Dr. William H. Reid, smoke inspector of Chicago. Among Dr. Reid's suggestions are the following:

Domestic consumers who burned hard coal last winter may, under the United States Fuel Administration's rules, order two-thirds as much of this as they used last year; the remainder must be made up of bituminous, or soft, coal from Illinois, Indiana and Kentucky mines.

SELECT SAME SIZES.

In buying soft coal the householder should select coal of the same size as the hard coal used, the size not to exceed 3-in. lumps.

Fire bituminous coal by placing the fresh charge on only one side of the grate, leaving part of the surface of the fuel bed uncovered; this reduces heat losses from incomplete combustion and makes cleaning of flues necessary less frequently.

In firing anthracite spread this coal completely over the bed of live fire underneath and disturb as little as possible.

To make up hard coal deficit it is advisable that at least 1½ tons of soft coal be substituted for one ton of hard coal.

It may be advisable to burn soft coal exclusively in mild weather so the hard coal may be saved for severe winter weather.

HOW TO MIX COAL.

It is recommended that wherever advisable coal be stored in separate piles and mixed as used.

The two fuels can be mixed before firing, or the soft coal can be thrown on the fire first and then covered with hard coal. Both methods have been used successfully.

Mr. Reid emphasizes the importance of cleaning the boiler, ashpit, grates, tubes and all gas passages, including smoke pipe connection between the boiler and chimney, at the beginning of the heating season before a fire is started.

Housing Accommodations for War Workers.

One of the problems of war-time production is the stabilizing of labor supply in connection with the gigantic construction and industrial undertakings upon which the War Department has embarked. Many cities containing factories producing munitions are congested by war workers beyond the power of these cities to furnish community facilities for the newcomers.

The programme to be worked out by the War Department, through the Community Organization Branch, includes the formation of housing companies and of building and loan associations, the encouragement of home-building by individuals and the extension of water, sewer, gas and electric service to the new housing districts.

The Third Liberty Loan yielded $4,170,019,650, subscribed to by about 17,000,000 buyers, it has been officially announced by the Treasury Department.

Naval Aviation Open to the Trade.

Word has been received that the naval aviation section of the Naval Reserve

Force needs a great number of men immediately. Good ratings and good pay are possible for qualified men. The list of ratings and the necessary trades are as follows:

Machinists' Mates.—General machinists, automobile mechanics and assemblers, toolmakers, die-makers and similar mechanical trades.

Quartermasters.—Cutters and cloth fitters, upholsterers, canvas workers, painters, tent riggers.

Carpenters' Mates.—Woodworkers of all kinds.

Blacksmiths.—Toolsmiths, forge men, furnace men, etc.

Coppersmiths.—

Shipfitters and all kinds of sheet metal workers.

Applicants must be American citizens from 18 to 35 years of age. Draft registrants will be accepted upon presentation of a letter from their local boards.

Men of the foregoing trades will be sent to school for special training. Applicants may enroll at 51 Chambers Street, New York, or at any Naval Recruiting Station in the United States.

Establishment of "Return Load" Bureaus.

"Return Load" bureaus have been established in 32 cities, according to an announcement of the National Automobile Chamber of Commerce, to assist shippers who have difficulties and delays in shipping by rail because of freight and express embargoes and shortage of freight cars. A list of these bureaus is published by the chamber, at 7 East 42nd Street, New York. In addition to putting shippers in touch with truck operators who can render service in inter-city hauling, the bureaus will also list merchants and manufacturers who have goods to ship. Thus a merchant in New York City, wishing to ship a 5-ton load to Hartford, Philadelphia or any other city where there is a "return loads" bureau, will, upon calling up the Merchants' Association in New York (telephone, Barclay 7660) be given advance information of any truck coming from such city with a load and desiring a return load.

Chicago Engineering Societies Co-Operate in War Work.

A joint war committee has been formed by representatives of technical societies centered in Chicago, with the purpose of placing at the disposal of the Government and possibly other authorized agencies the combined strength and resources for war work, as the need may arise. Meetings are held at the Chicago Engineers' Club. Edgar S. Nethercut of the committee is also secretary of the Western Society of Engineers, at 1735 Monadnock Building. Among the organizations represented on the committee is the Illinois Chapter of the American Society of Heating and Ventilating Engineers.

Heating Men in Military Service.

B. E. La Follette, who has had charge of the engineering, sales and advertising departments for the Clarage Fan Co., Kalamazoo, Mich., has resigned to enter Government service. He will be located either in Philadelphia or Washington as an engineer with the Requirements Division of the United States Shipping Board.

First Lieut. Oliver E. Willis, of the Ordnance Reserve Corps, has been transferred from Camp Hancock, Ga., to Edgewood, Md. Arsenal and placed on duty with the guard company. For the past two months he has been stationed at Camp Hancock in command of Third Company, Sixth Battalion, First Regiment, in the training of ordnance recruits.

NATIONAL DISTRICT HEATING ASSOCIATION

Committee Meetings Held July 8-9, 1918, at Cedar Point, Ohio.

While there will be no regular convention of the National District Heating Association this year, arrangements have been made to hold meetings of the executive committee, together with the chairmen of the standing committees and as many of the members as possible, at the Breakers Hotel, Cedar Point, Ohio, July 8 and 9, to discuss various matters now affecting the heating companies and to receive the reports of the standing committees for the year.

Relative Cost of Pipe Coils and Radiators.

Discussing further the relative cost of pipe coils and cast-iron radiator, a correspondent writes:

"There is considerable room for argu-

ment on this question just at present. This is due largely to the variable labor factor which enters into the making and hanging of the coils. That is to say, a contractor can make coils up in his shop during spare time, and at odd hours when time cannot be profitably employed elsewhere. Also a cheaper man can be utilized to make up coils in the shop than would be required to send out on a job to install work.

"Having been connected with several of the largest of the local heating contractors for over 20 years as their estimator I have developed a system of keeping a tally on the actual costs of various operations in heating work by means of which I have and can produce some remarkably accurate estimates. Having revised and refigured these factors to suit labor and material prices of to-day I am inclined to the opinion that pipe coils have the best of it when made economically and in reasonably large units. Pipe coils certainly are cheaper when compared to legless radiators which require wall supports, and with wall radiators if the difference in efficiency is allowed for.

"On the other hand if small units are in question, or if column radiators standing on the floor are the alternative, or if the coils are not made up in an economical manner, a contractor might easily have his costs run a little higher on coils."

A Building Contractor's Satire on Architects' Specifications.

General: The plans and specifications are to be taken together. Anything shown in the plans and not mentioned in the specifications and anything mentioned in the specifications and not shown on the plans is to be considered as both shown and specified; and anything wanted by the architect or any of his friends, or anybody else, (except the contractor) shall be considered as shown and specified, implied and required, and shall be provided by the contractor without expense to anybody but himself. If he can do the work without expense to himself, the work shall be taken down and done over again, until the expense is satisfactory to the architect.

Architect: The term architect herein appearing shall be understood to mean the architect or any engineer that he foolishly but courteously employs to assist in making trouble for the contractor.

Plans: The plans are to be considered diagramatic, and are to be followed only where space conditions make it possible to avoid so doing. Co-incidence between the plans and executed work shall not be considered a claim for extra compensation. The architect is not required to recognize coincidence. Anything that is right on the plans is to be considered right; anything that is wrong on the plans shall be discovered by the contractor, and shall be made right without telling on the architect or on bills. Anything that is forgotten or missed out of the plans and specifications, but which is necessary and required for the comfort and convenience of the owner, shall be provided by the contractor, to the satisfaction of everybody (except the contractor) and in full accord with the evident intent and meaning of the specifications, without extra cost to anybody but the contractor.

Rules and Regulations: The work throughout shall comply with all rules, regulations, caprices and whims of all city, county, State, national and international departments, bureaus and officials having or not having jurisdiction.

Materials: All the materials shall be the best of their several kinds. The contractor is expected to know and provide the best, irrespective of what is specified in detail. The architect reserves the right to change his mind about what is best. Any changes necessary to make work and material fit the mind of the architect shall be made by the contractor without extra charge.

Permits: The contractor shall obtain and pay all fees, annual dues, assessments and subscriptions to masked balls, organizations and coat and hat checks.

Guarantee: The contractor shall guarantee and does guarantee that he will keep in complete working order, anything that the architect asks him to attend to, so long as there is more work in sight in the architect's office.

Arbiter: In case of any dispute arising as to the nature, character, or extent of work shown, specified or implied, the matter will be decided by referendum and recall, after which the decision shall be set aside and revised by the architect and designer-in-chief of the national government.

Payments: Payments, if any, shall be made on the architect's certificate. Architects' certificates shall not be considered negotiable, nor are they legal tender. When once issued, the architect assumes no responsibility for their future usefulness. Partial payments shall be made as the work progresses in the amount of 85 per cent. of the value of the work done, as judged by the architect. In no case shall the judgment of the architect cover more than enough to pay the wiremen and helpers every Saturday night. The ma-

terial men must take the customary chances. The final payment, if any, shall be made when everybody is satisfied (but the contractor). Any evidence of satisfaction on the part of the contractor shall be considered a just cause for withholding final payment.

The contractor shall accept and hereby does accept the conditions hereinbefore appearing, for himself, his ancestors and progenitor, his family, heirs, executors, his ox, his assignee and the stranger within his gates.—*From the Architect and Engineer.*

Unique Ventilating System for One-Story School Buildings.

A novel method of ventilating a one-story school building is being used by Mullard & Pollard, architects, of Fort Worth, Texas. It is a unit classroom system, the heating coils, fan and plenum chamber being located in each classroom, located in the "attic" of the cloakroom, which is divided horizontally so that the height of the ceiling for the wardrobe proper is 7 ft., the full story height being 13 ft. Louvres are placed above the cloakroom window, fronting the individual air intakes. The exhaust air passes through a register at the bottom of the cloakroom door and out through an exhaust flue at the end of the cloakroom.

One of the advantages mentioned for this arrangement is that the control is always in the hands of the teachers. It is stated that the operation of the fan is not noticeable.

School House Ventilation Law in Texas.

A new State law on ventilation for school buildings has been added to the list by the legislature of Texas. The law is known as "the State Schoolhouse Building Law," and covers lighting, heating and ventilating, interior woodwork, building permit, and penalty. Under "Heating and Ventilating," the law reads:

Section 5. That all schoolhouses shall be provided with sufficient heating apparatus.

Section 6. That all stoves, radiators or other sources of direct heat located within the class rooms or study halls shall be so jacketed, ventilated or otherwise protected that the desks upon the side next to the stove, radiator or other source of heat shall not be more than 5° F., hotter than the desks upon the opposite of the room.

Section 7. That all stoves, radiators or other sources of direct or indirect heat supplying heat for a class room or study hall shall be equipped with an automatic temperature regulator that will regulate the temperature of said class room or study hall automatically to within 2° of any set standard.

Section 8. That every class room or study hall shall be provided with an efficient apparatus whereby in cold weather a supply of 30 cu. ft. per minute of fresh, warm air shall be supplied to each pupil in such manner as not to place any pupil in a disagreeable draft, and shall be provided with exhaust flue or flues, with inlets at or near the floor line, so arranged as to effectively carry out of the room the cold and impure air without placing any pupil in a disagreeable draft.

Completes Twenty-Five Years of Service With "Metal Worker."

Few men in the heating and plumbing and sheet metal trades are more widely or better known than Frank K. Chew, editor of the *Metal Worker*, and dean of the trade journalists in these fields. Unusual interest, therefore, attaches to the twenty-fifth anniversary of his service with the *Metal Worker*, April 10, 1918, which was made the occasion of congratulations and a presentation on the part of his co-workers, headed by his former associate, W. W. Macon. The presentation took the form of an Auto Graflex camera, a peculiarly appropriate gift in view of Mr. Chew's well-known talents as a photographer.

Mr. Chew's business career has been devoted entirely to the trade represented by the *Metal Worker*. This period is perhaps best described by himself, in referring to his anniversary.

"I left school abruptly," he said, "because there was an opening in a shop that did furnace heating, tin roofing and plumbing, sold stoves and house-furnishing goods and agricultural implements, so that one day I might be working on any of the various branches of this industry.

"After six years, because of my familiarity with the line of stoves made by the firm of Cox, Whiteman & Cox, of Philadelphia, I was engaged to fill the vacancy at the bottom left by those who were promoted to take the places made by the death of two members of the old firm. For a number of years I was with the concern which became the Abram Cox Stove Company.

"After some experiences with another concern in the manufacture of gas-burning apparatus I engaged on April 10, 1893, with *Metal Worker*."

Mr. Chew's activities in promoting the interests of the trade, both through the columns of the *Metal Worker*, and through his personal efforts, are reflected in many achievements that have left their permanent impress on the industry. That these activities are still in full swing is shown by his close connection with such movements as the proposed standard code of the heating engineers for warm-air furnace heating, and similar movements.

His many friends, both in and out of the trade, will wish him many more years of health and service in his chosen field.

New Publications.

FUEL ECONOMY IN THE OPERATION OF HAND-FIRED POWER PLANTS, containing suggestions to owners, managers, superintendents, engineers and firemen for effecting greater economy and in determining the properties and characteristics of the coal purchased, has been published by the Engineering Experiment Station of the University of Illinois.

It is a 90-page booklet, printed in four colors, and presents data to show that the average small power plant can save 15% of its fuel by the exercise of greater care in equipment and operation. This means a saving of twelve or thirteen million tons per annum if applied throughout the country.

Features of installation essential to the proper combustion of fuel are discussed, the practise to be observed in the operation of the plant is outlined; and the employment of simple devices for indicating conditions of operation is prescribed.

The scarcity of coal last winter and the recent warnings of the fuel administration regarding the possibility of a shortage next winter emphasize the need for greater economy in the use of fuel. The present high rate of production is still insufficient to supply all needs and there seems to be no possibility of an increase in the output of the mines sufficient to satisfy every demand.

There are two possible results of his fuel shortage; either certain industries must close down or more work must be done with the coal available.

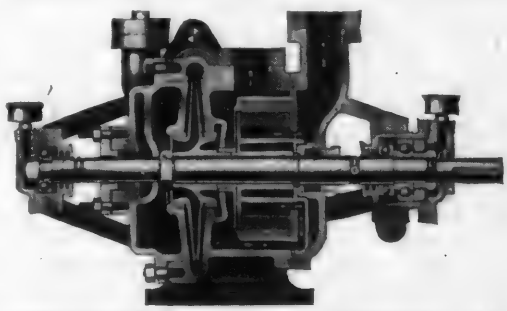
A number of leading engineers acted as an advisory committee in the preparation of the publication which is listed as Circular No. 7. The edition is limited.

DIRECTORY OF THE AMERICAN ASSOCIATION OF ENGINEERS is the title of a unique publication containing a membership list of that organization arranged with the idea of assisting the employer of technical men to obtain the right engineer for his work. Such space as is permitted is given to the experience of each member. The information is also classified. It is the intention to place this directory with every large commercial association and business office in the country. Some 2500 members are listed. Size 6x9 in. (standard) pp. 250. Price, $2.00.

REPORT ON THE THERMAL TESTING PLANT FOR 1916-1917 being Bulletin No. 24 of the Engineering Experiment Station of the Pennsylvania State College, has been received. It is compiled under the authorship of R. B. Fehr. The present tests were undertaken primarily to ascertain where the greatest resistance was offered to the passage of heat through a comparatively good conductor such as glass. Another purpose was to establish a suitable location for inside and outside thermometers in the testing plant. It was learned from the tests that the glass itself offers but slight resistance to the flow of heat, but that the air layers within ½ in. of both surfaces are responsible for the greater part of the resistance. An outside air velocity of 1000 ft. per minute increases the transmission about 70%. Size 6x9 in. Pp. 24.

Trade Literature.

JENNINGS TURBINE VACUUM AND LOW-PRESSURE BOILER-FEED PUMPS are brought to the attention of the trade in a well-compiled and carefully-illustrated circular published by the Nash Engineering Co., South

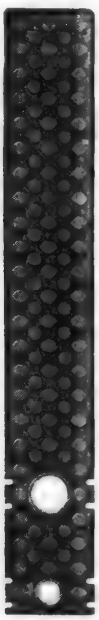


LONGITUDINAL SECTION SHOWING ARRANGEMENT OF AIR AND WATER PUMPS ON THE SAME SHAFT.

Norwalk, Conn. These pumps are used for return-line heating systems, or other vacuum work where large percentages of liquids have to be handled with gas. The pump consists of two independent turbine units, an air pump and a water pump, combined in one casing, with the impeller

of each mounted on the same shaft. One unit continuously exhausts air and vapors from the heating system and the other removes the condensation as it accumulates and forces it directly into the boiler, or up to the hot well. Emphasis is laid on the fact that the boiler pressure is against the water only, the air and vapor being delivered to the atmosphere without back pressure. It is stated that the saving in horse-power amounts to over 50%. The air unit of the Jennings pump is the well-known Nash hydroturbine. All parts of the pump are illustrated in section and in operation. Data are included for determining required sizes. Size 8 x 11 in. Pp. 8.

F. & K. HOT-BLAST RADIATORS, made by the F and K Products Co., Cleveland, O., are illustrated and described in a circular devoted to this product. This radiator is



"F and K" HOT-BLAST RADIATOR.

the invention of W. M. Kingsbury and M. L. Foote. It is of cast iron and is made in single sections, and assembled with slip nipples. Features of its construction include a divided steam chamber, and provision for air impingement, while attention is also called to the ease with which it may be assembled. The internal construction of each section is divided into three parts, a center chamber and two outer chambers. The center chamber receives the steam and is conveyed to the top of each section for distribution to the two outer chambers without coming into contact with the steam, water or air of the outer chambers. By this method of construction, a drop or minus pressure in the outer chambers is obtained, which causes a partial vacuum to be formed, thereby causing the air and steam to be drawn completely through the entire section and to be expelled through the return chamber. By this method no air binding can occur which makes every square foot prime and effective heating surface. The extended cored heating surface is set on an angle running horizontally and spaced equally in form so as to split the incoming air. The friction is divided by the projections being so formed that three rows are splitters and the two inner rows are circles designed to wrap the air which makes the impingement perfect and all sides effective. The resistance can be increased or decreased by varying the length of the slip nipple, giving any free area desired. The "F and K" hot-blast radiator is made in three heights, 40-in., 50-in., and 60-in., and 9 3/16-in. wide, with any spacing desired.

CLARAGE STYLE C PRESSURE BLOWERS are discussed in a new engineering catalogue issued by the Clarage Fan Co., Kalamazoo, Mich. (Catalogue No. 22.) These blowers may be classed as steel-plate fans, as they are built with housings or casings, of heavy sheet steel on an angle-iron frame. They are especially suited for operation at comparatively high speeds and against moderately high pressures. The multiblade wheel used with these fans, it is stated, is responsible for the high mechanical efficiency, besides making it possible to handle relatively

MULTIBLADE WHEEL USED IN CLARAGE STYLE C "HIGH-EFFIENCY" BLOWERS.

large volumes and to maintain high pressures with a small size and low speed. The fans are intended principally for delivering moderate volumes against pressures of from 5 to 15 in. water gauge. The catalogue takes

up, with the usual thoroughness characteristic of this company in its published matter, the details of construction, together with a set of capacity tables covering the range of each size of fan. Size, 8½x11 in. (Standard). Pp. 16.

AUTOVENT MODERN VENTILATING APPARATUS is the subject of a new catalogue (fifth edition) published by the Batterman Truitt Co., Chicago, Ill. In addition to the company's line of Autovent motor-driven propeller fans, for use with both alternating and direct current, the catalogue describes the Autovent louvre, the construction of which is

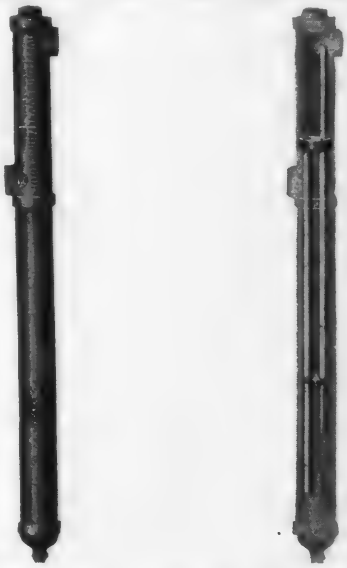
AUTOVENT LOUVRE CLOSED.

shown in the accompanying illustration. These louvres are round in design to correspond with the various sizes of fans. They are especially designed to prevent back draft and to provide weather protection to fan openings when the fan is not running. They consist of a number of semi-circular vanes connected together in series and pivoted slantingly, which drop into a closing position without exerting an excessive resistance against their opening movement caused by air directed against them from the opposite side. When the vanes are open or in a partly-open position, they assume an angle designed to afford a better passage of air from the fan than is obtained by the ordinary louvre. The vanes of the louvre are made of galvanized iron, while all working parts are made of brass. Installation dimensions are included, with the additional note, "all sizes carried in stock for quick shipment." Size of catalogue, 3½x6¼ in. Pp. 22.

"ACCEPTED AND APPROVED" is the title of a circular giving the results of an efficiency test, made at Purdue University, Lafayette, Ind., of Clarage Kalamazoo vertical steam engines. The circular summarizes the test and the conclusion reached and note is made that the complete test is on file and will be shown to those interested. It was found, among other things, that the horsepower developed was large, the mechanical efficiency "very high," and the steam consumption below the average. Illustrated descriptive matter regarding this type of engine is included in the circular, including a cross-section view. The engines are stated to be especially suited for driving stokers or mechanical draft apparatus, small generators or centrifugal pumps, and fans or blowers.

Hoffman Equalizing Loop.

A unique appliance, known as the Hoffman equalizing loop has been brought out by the Hoffman Specialty Co., Chicago, Ill. As will be seen from the accompanying illustration, the Hoffman equalizing loop is made entirely of metal, without moving parts or mechanical device of any kind. The upper part of the loop, shown in the accompanying sectional view, is made of special casting, having a diaphragm just above the lower side inlet



Exterior View. Phantom View.

HOFFMAN EQUALIZING LOOP.

which divides the loop into upper and lower chambers. The upper and lower openings of the loop are tapped for 1¼-in. pipe. The upper and lower chambers are connected by means of two brass pipes screwed into the diaphragm. One of these pipes extends above the diaphragm, the other being flush with the diaphragm. The lower end of one of the pipes is slotted vertically, as shown in the illustration.

The steam supply connection from the

top of the boiler or from the supply main is connected into the lower opening of the casting and the operation of the loop is peculiar, in that it is entirely neutral, performing no function except that of freely passing such condensation as may come to it, so long as the boiler pressure is 10 oz. or less. Should, however, the boiler pressure exceed 10 oz. the water is pushed down in the loop until the slotted pipe is uncovered, when steam immediately passes through the slot into the return line, thus tending to balance the pressure between the two lines.

The function of the slotted pipe is to pass just sufficient steam into the return line to maintain the pressure in the supply line 10 oz. greater than in the return line, when the pressure on the boiler is over 10 oz.

So long as the boiler pressure is above 10 oz. the differential between the supply and return line is exactly 10 oz., no matter whether the pressure is 10 oz. or 5 lbs., and this 10 oz. differential causes the water to stand in the vertical return pipe just 17 in. higher than the water line in the boiler, and the water loss from the boiler is measured by the quantity contained in the vertical pipe to a height of 17 in.

Therefore this device, it is stated, will maintain an unvarying water line in the boiler, independent of boiler pressure, and hence the water line in the boiler is never lowered to a point where the heat from the fire can exert an influence that is destructive to the castings which compose it.

Ventilating Equipment of a Fifth Avenue Residence, New York.

One of the well-known landmarks of New York is a large brown-stone residence on the corner of Fifth Avenue and 51st Street. This dwelling was built many years ago before modern conveniences were known and though from time to time improvements have been added, it has heretofore lacked a system of mechanical ventilation. This defect has now been remedied, however, and a complete system has been put in.

In all, three motor-driven ventilating fans have been installed, for the kitchen, ball room and picture gallery, and the toilets, respectively. These sets are installed in the upper floors in small rooms where they are out of sight but readily inspected when necessary. Quiet operation is essential for installation of this kind and the equipment was selected with this feature in mind. All three fans are started and stopped by push buttons placed in or near the rooms served so that the ventilation can be readily controlled at the point where the air is needed. The speed of the motors is regulated by means of manually-operated field-and-armature control rheostats.

ARRANGEMENT OF TOILET EXHAUST OUTFIT IN FIFTH AVENUE RESIDENCE.

The toilet exhaust outfit is somewhat unusual. It consists of a vertical 2 H. P. Westinghouse direct-current motor, 333/500 R.P.M. coupled to a 36-inch Blackman fan. The motor rests on a cast-iron base which is carried by I-beams set in the wall. The air is carried by ducts which terminate in the closet containing the motor and is then exhausted into the open air.

The ball room and picture gallery set consists of the same type and size of motor and fan, but the fan is mounted horizontally and carries the motor directly on its shaft.

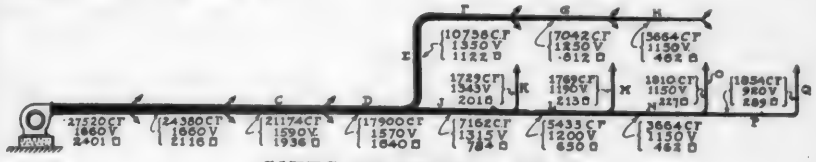
The kitchen exhaust set consists of a 2 H.P. Westinghouse direct-current motor, 266/400 R.P.M.; and a No. 4 Sirocco blower.

Baker Smith & Co., New York, were the ventilating engineers.

John A. Stevens Trust Fund has been established by The American Society of Mechanical Engineers, through the generosity of John A. Stevens, to promote progress in the art of engineering. The fund consists of a $15,000 insurance policy which will eventually be turned over to the society. The net annual income accruing from this fund will then be allotted annually in equal shares to the person or persons who have that year invented or been responsible for an invention having to do with the conservation of light, heat and power.

SIZING OF DUCTS AND FLUES. METHOD NO. 5.

NOTE.—For explanation and example assumed see Standard Data Sheets Nos. 10-M and 10-N.



SIZES BY METHOD NO 5

A method used by another prominent engineer provides for temperature drop in the duct and then utilizes the equivalent number of 1-in. pipes in determining the duct areas. The amount of temperature drop is variable, depending upon the material used for the construction of the duct, its location, and its insulation. It is a very simple proposition to test the temperature drop for any length of run in an installation already working and to thus develop the number of feet of run for 1° drop in temperature. For convenience in calculating, it has been assumed in the following that there is 1° drop in every 20 ft. of run and the temperature at the fan is assumed as 120° F.; thus, the air 20 ft. from fan would be 119° F., at 40 ft., 118°, etc.

The formula to obtain the quantity of air for any given B. T. U. loss per hour is:

$$\text{Cubic feet per minute equals } \frac{\text{B. T. U.}}{60\ (T\text{-}t)\ DS}$$

When B. T. U. = heat required in B. T. U. per hour.
T = temperature F. of entering air.
t = temperature F. of room air.
D = density of entering air at temperature T.
S = specific heat of air.
60 = number of minutes in an hour.

If the heat loss in each room is exactly equal to the heat brought in by the 1500 cu. ft. of air at 120° F. and 70° F. is the room temperature, the heating requirement is

$$\frac{1500 \times (120 - 70) \times 60}{60} \text{ or } \frac{1500 \times 50 \times 60}{60} = \frac{4500000}{60} = 75000 \text{ B.T.U.}$$

50 being the number of cubic feet 1 B. T. U. will raise 1° at 120° (temperature T).

Then by substituting, the C.F.M. (for any outlet where the B.T.U. loss is 75000 B. T. U.) will equal:

$$\frac{75000}{60 \times (T\text{-}t) \times 0.0685 \times 0.2375}$$

At 1° drop in temperature every 20 ft. the temperature at the outlets at the end of duct will be

A = 119°	F = 114°	K = 114½°
B = 118°	G = 113°	M = 113½°
C = 117°	H = 112°	O = 112½°
		Q = 111½°

$$A = \frac{75000}{60 \times (119\text{-}70) \times 0.0685 \times 0.2375}$$

(Continued on Sheet No. 10-S)

METHOD NO. 5—Continued.

(Concluded from Sheet No. 10-R)

The fall in temperature is so slight in any one system that to save computation.

$$\frac{75000}{60 \times 0.0685 \times 0.2375}$$

may be reduced to a constant, which divided by (T-t) will equal C. F. M. This reduces to

$$\frac{75000}{0.976125} \text{ or } 76940$$

Then

$$A = \frac{76940}{119-70} \times 2, \text{ or } \frac{76940}{49} \times 2,$$

or $1570 \times 2 = 3140$

$$B = \frac{76940}{118-70} \times 2, \text{ or } 1603 \times 2 = 3206$$

$$C = \frac{76940}{117-70} \times 2, \text{ or } 1637 \times 2 = 3274$$

$$F = \frac{76940}{114-70} \times 2, \text{ or } 1748 \times 2 = 3496$$

$$G = \frac{76940}{113-70} \times 2, \text{ or } 1789 \times 2 = 4578$$

Then

$$H = \frac{76940}{112-70} \times 2, \text{ or } 1832 \times 2 = 3664$$

$$K = \frac{76940}{114\frac{1}{2}-70} = 1729$$

$$M = \frac{76940}{113\frac{1}{2}-70} = 1769$$

$$O = \frac{76940}{112\frac{1}{2}-70} = 1810$$

$$Q = \frac{76940}{111\frac{1}{2}-70} = 1854$$

The total air to be delivered by the fan is the sum of these totals, or

A 3,140, B 3,206, C 3,274, F 3,496, G 3,578, H 3,664, K 1,729, M 1,769, O 1,810, Q 1,854. Total 27,520 C. F. M.

The same steel plate fan previously considered will deliver the required amount of air and, as previously noted, its outlet is 42 in. x 42 in. or equivalent to 11,432 1-in. pipes. Then the

$$\frac{11432}{27520} = 0.415$$

Say 0.42, the number of 1-in. square pipes to be allowed to each cubic foot of air per minute, this being called the factor (F). This factor, however, is usually made from 0.6 for shorter systems to 0.7 for longer systems to avoid excessive friction losses and high velocities. If 0.6 is used:

C.M.F.		F.		1-in. Sq. Pipes
3140	x	0.6	=	1884
3206	x	0.6	=	1924
3274	x	0.6	=	1964
3496	x	0.6	=	2098
3578	x	0.6	=	2147
3664	x	0.6	=	2198
1729	x	0.6	=	1037
1769	x	0.6	=	1061
1810	x	0.6	=	1086
1854	x	0.6	=	1112

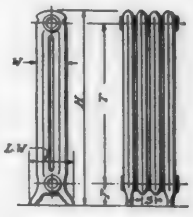
Duct sizes with allowance for temperature drop, Method No. 5.

H	= 2198, or 21 in. x 22 in.	=	462 sq. in. of duct.
G	= 2198 + 2147 = 4345, or 28 in. x 29 in.	=	812 sq. in. of duct.
E and F	= 4345 + 2098 = 6443, or 33 in. x 34 in.	=	1122 sq. in. of duct.
P and Q	= 1112, or 17 in. x 17 in.	=	289 sq. in. of duct.
O and N	= 1112 + 1086 = 2198, or 21 in. x 22 in.	=	462 sq. in. of duct.
M and L	= 2198 + 1061 = 3259, or 25 in. x 26 in.	=	650 sq. in. of duct.
K and J	= 3259 + 1037 = 4296, or 28 in. x 28 in.	=	784 sq. in. of duct.
E and J	= 4296 + 6443 = 10739, or 40 in. x 41 in.	=	1640 sq. in. of duct.
C	= 10739 + 1964 = 12703, or 44 in. x 44 in.	=	1936 sq. in. of duct.
B	= 12703 + 1924 = 14627, or 46 in. x 46 in.	=	2116 sq. in. of duct.
A	= 14627 + 1884 = 16511, or 49 in. x 49 in.	=	2401 sq. in. of duct.

It can readily be seen that the proper quantity of air will be delivered to maintain the heat equilibrium and that the duct friction is kept at a fairly constant point, although not quite constant, as no allowance is made for bends, transformations, etc., and while the duct sizes thus obtained increase toward the far end of the system it is only because they are expected to handle a greater quantity of air at the same friction loss per foot of duct in order to compensate for temperature drop in the duct.

H. B. SMITH CO.'S PRINCESS TWO-COLUMN RADIATORS FOR STEAM AND WATER.

Sections	Total Length ft - in.	HEIGHT, INCHES 45 — 8 ft. per sec.	37 — 4 ft. per sec.	31 — 3½ ft. per sec.	25 — 3 ft. per sec	22 — 2½ ft. per sec	19 — 2¼ ft. per sec.
3	0 - 10	15	12	10⅓	9	7⅞	6⅞
4	1 - 1	20	16	14	12	10½	9
5	1 - 4	25	20	17⅓	15	13⅛	11¼
6	1 - 7	30	24	21	18	15¾	13½
7	1 - 10	35	28	24⅓	21	18⅜	15¾
8	2 - 1	40	32	28	24	21	18
9	2 - 4	45	36	31⅓	27	23⅝	20¼
10	2 - 7	50	40	35	30	26¼	22½
11	2 - 10	55	44	38⅓	33	28⅞	24¾
12	3 - 1	60	48	42	36	31½	27
13	3 - 4	65	52	45⅓	39	34⅛	29¼
14	3 - 7	70	56	49	42	36¾	31½
15	3 - 10	75	60	52⅓	45	39⅜	33¾
16	4 - 1	80	64	56	48	42	36
17	4 - 4	85	68	59⅓	51	44⅝	38⅜
18	4 - 7	90	72	63	54	47¼	40½
19	4 - 10	95	76	66⅓	57	49⅞	42¾
20	5 - 1	100	80	70	60	52½	45
21	5 - 4	105	84	73⅓	63	55⅛	47¼
22	5 - 7	110	88	77	66	57¾	49½
23	5 - 10	115	92	80⅓	69	60¾	51¾
24	6 - 1	120	96	84	72	63	54
25	6 - 4	125	100	87⅓	75	65⅝	56¼
26	6 - 7	130	104	91	78	68¼	58½
27	6 - 10	135	108	94⅓	81	70⅞	60¾
28	7 - 1	140	112	98	84	73½	63
29	7 - 4	145	116	101⅓	87	76⅛	65¼
30	7 - 7	150	120	105	90	78¾	67½



DIMENSIONS

H = Total overall height.
T = C. to C. of tappings.
F = Floor to center of bottom tapping.
W = Width of radiator—5 1/4 in.
WL = Width of radiator legs—5 1/4 in.
S = Width of radiator sections—3 in.

Nominal Height of Radiator	45-in.	37-in.	31-in.	25-in.	22-in.	19 in.
H	45	37	31	25	22	19
T	38 3/8	30 3/8	24 3/8	18 3/8	15 3/8	12 3/8
F	4 5/8	4 5/8	4 5/8	4 5/8	4 5/8	4 5/8

Note: For legless radiators deduct 3 in. from H.
For extra high legs add 1 in., 2 in., 3 in., or 4 in. to H. and to F.
On all radiators extra high legs are special.

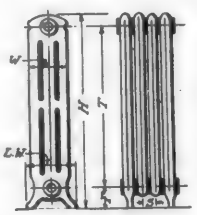
TAPPING DATA

SYSTEM	Size of Radiator Square Feet	Supply In. Diam.	Return In. Diam.
Steam, one-pipe	Up to 30	1	.....
	Over 30 up to 60	1 1/4	.....
	Over 60 up to 120	1 1/2	.....
	Over 120	2	.....
Steam, two-pipe	Up to 50	1	3/4
	Over 50 up to 120	1 1/4	1
	Over 120	1 1/2	1 1/4
Water	Up to 50	1	1
	Over 50 up to 120	1 1/4	1 1/4
	Over 120	1 1/2	1 1/2

All air valve tappings are 1/8 in., those for water radiators being set at top.
All tappings with R. H. threads, unless otherwise ordered.

H. B. SMITH CO.'S PRINCESS THREE-COLUMN RADIATORS FOR STEAM AND WATER.

Sections	Total Length ft. – in.	HEIGHT, INCHES 45 — 8 ft. per sec	37 — 6½ ft. per sec.	31 — 5½ ft. per sec.	25 — 4½ ft. per sec.	22 — 4 ft. per sec.	19 — 3½ ft. per sec.
3	0 – 10¾	24	19½	16½	13½	12	10½
4	1 – 2	32	26	22	18	16	14
5	1 – 5¼	40	32½	27½	22½	20	17½
6	1 – 8½	48	39	33	27	24	21
7	1 – 11¾	56	45½	38½	31½	28	24½
8	2 – 3	64	52	44	36	32	28
9	2 – 6¼	72	58½	49½	40½	36	31½
10	2 – 9½	80	65	55	45	40	35
11	3 – ¾	88	71½	60½	49½	44	38½
12	3 – 4	96	78	66	54	48	42
13	3 – 7¼	104	84½	71½	58½	52	45½
14	3 – 10½	112	91	77	63	56	49
15	4 – 1¾	120	97½	82½	67½	60	52½
16	4 – 5	128	104	88	72	64	56
17	4 – 8¼	136	110½	93½	76½	68	59½
18	4 – 11½	144	117	99	81	72	63
19	5 – 2¾	152	123½	104½	85½	76	66½
20	5 – 6	160	130	110	90	80	70
21	5 – 9¼	168	136½	115½	94½	84	73½
22	6 – ½	176	143	121	99	88	77
23	6 – 3¾	184	149½	126½	103½	92	80½
24	6 – 7	192	156	132	108	96	84
25	6 – 10¼	200	162½	137½	112½	100	87½
26	7 – 1½	208	169	143	117	104	91
27	7 – 4¾	216	175½	148½	121½	108	94½
28	7 – 8	224	182	154	126	112	98
29	7 – 11¼	232	188½	159½	130½	116	101½
30	8 – 2½	240	195	165	135	120	105



DIMENSIONS

H = Total overall height.
T = C. to C. of tappings.
F = Floor to center of bottom tapping.
W = Width of radiator.
WL = Width of radiator legs.
S = Width of radiator section.

Nominal Height of Radiator	45-in.	37-in.	31-in.	25-in.	22-in.	19 in.
H	45	37	31	25	22	19
T	38 3/3	30 3/3	24 7/16	18 9/16	15 3/8	12 9/16
F	4 5/8	4 5/8	4 5/8	4 5/8	4 5/8	4 5/8

Note: For legless radiators deduct 3 in. from H.
For extra high legs add 1 in., 2 in., 3 in., or 4 in., to H. and F.
On all radiators extra high legs are special.

TAPPING DATA

SYSTEM	Size of Radiator Square Feet	Supply In. Diam.	Return In. Diam.
Steam, one-pipe	Up to 30	1	.....
	Over 30 up to 60	1 1/4	.....
	Over 60 up to 120	1 1/2	.....
	Over 120	2	.....
Steam, two-pipe	Up to 50	1	3/4
	Over 50 up to 120	1 1/4	1
	Over 120	1 1/2	1 1/4
Water	Up to 50	1	1
	Over 50 up to 120	1 1/4	1 1/4
	Over 120	1 1/2	1 1/2

All air valve tappings are 1/8 in., those for water radiators being set at top.
All tappings with R. H. threads unless otherwise ordered.

TRADE AND MISCELLANEOUS NOTES

Miscellaneous Notes.

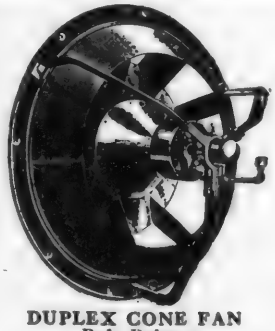
J. J. Wilson, New York, has been engaged as consulting heating and ventilating engineer for the Hires Condensed Milk Corporation, Philadelphia, Pa. This company has 61 plants in seven different States.

A. G. Cripps, vice-president and sales manager of the Prudential Heating Co., Akron, O., is recovering from a serious accident which befell him in Akron when he was struck down by a wagon in that city. Mr. Cripps was so seriously injured that for some time his recovery was doubtful. He is now able to sit up in a wheel chair at the hospital and the doctors state that he is well on the road to recovery.

Trade Extension Committee, which is in charge of the country-wide campaign for "Building Bigger Business," effected permanent organization at its meeting May 16, in Cleveland, by electing the following officers: President, L. McNamara (president of the National Association of Master Plumbers); treasurer, L. C. Huesmann. and secretary, Paul Blatchford, Chicago.

Cleveland Master Steam and Hot Water Fitters' Association, Cleveland, O., held its fifth annual outing May 18, at Horse Shoe Drive, Centre Ridge Road. One of the principal features of the day was a weird baseball game between the Fence Busters and the All Stars.

Master Steam and Hot Water Fitters' Association of New York State elected the following officers at its 24th annual convention in Syracuse, May 14: President, John



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R. Sheehan, Schenectady; vice-president, H. J. Brandeles, Utica; secretary-treasurer, William J. Olvany, New York; board of directors: the above-named officers and C. Ashmusen, Albany; William F. Devendorf, Rochester; John J. Doherty, Poughkeepsie; William T. Lane, Buffalo; Edward F. Joy, Syracuse; sergeant-at-arms, W. T. Cantwell, Utica.

Central Supply Association held its 77th regular meeting at the Congress Hotel, Chicago, June 20. President J. R. Steneck addressed the meeting on "Prevailing Business Conditions," his address being hopeful and optimistic in spite of adverse conditions and necessary restrictions. Other speakers were James F. Conran, of the Standard Sanitary Mfg. Co.; William J. Wolley, of Evansville, Ind., Morris R. Ebersole, of the American Radiator Co., C. V. Kellogg, and E. I. Leighton, of Fort Dodge, Ia. George D. McIlvaine, secretary of the National Pipe and Supplies Association, told of the results of his conferences in Washington on the iron and steel situation and tubular goods. A war service committee was appointed to act as a clearing house for information so that the members may be able to secure authoritative data as the need may arise. A resolution was passed condemning the practice of taking Liberty bonds for merchandise settlement,

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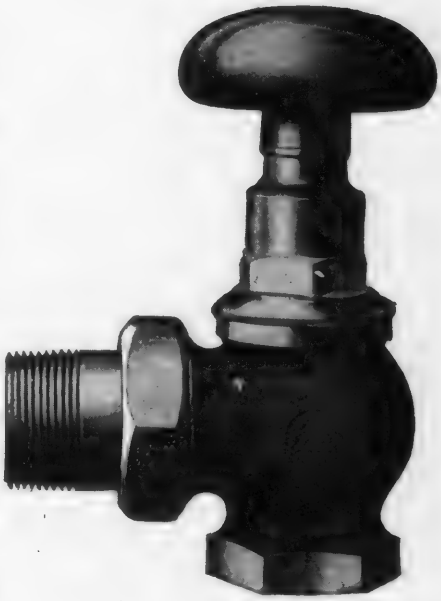

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except in such cases where the account is in actual jeopardy. It was voted to hold the next meeting of the association in Chicago on the third Wednesday in October.

Eastern Supply Association held its summer meeting at the Hotel Astor, New York, June 12. At the morning session Gypsy Smith gave a graphic picture of "British Y. M. C. A. Work at the Firing Line." J. Harvey Borton spoke on "Our Obligation to the Other Fellow." The "Trade Extension Movement" was the subject of an extended discussion, the point being made that it is serving to build up a sincere, get-together spirit in the trade. Wider support on the part of jobbers, it was argued, was needed to make the movement a complete success. The association unanimously adopted the trade acceptance plan and recommended its use by the members. One of the most important subjects taken up at the meeting was the steel situation. Announcement was made that committees representing the various branches of the industry using steel products, were to meet in Washington the next day to offer the Government a plan for judicial and equitable allotment of steel, as it is well known that there is not sufficient steel produced in the country to meet the war requirements of the United States and the Allies. The meeting was largely attended.

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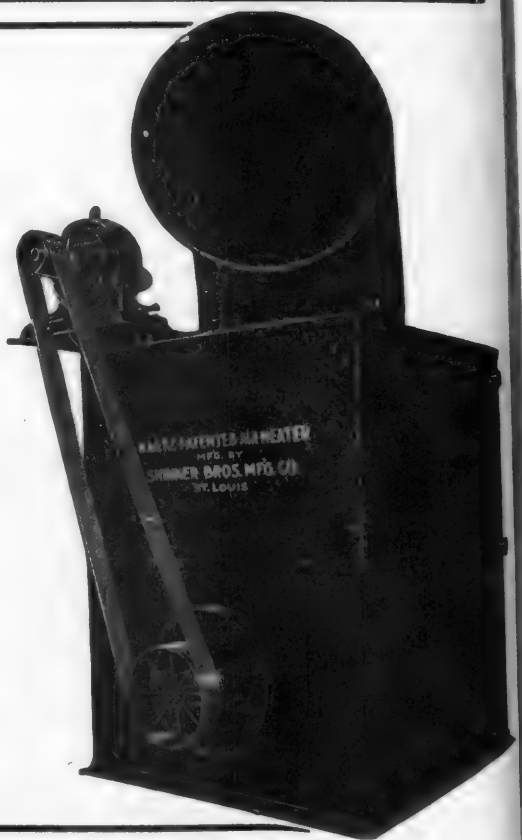


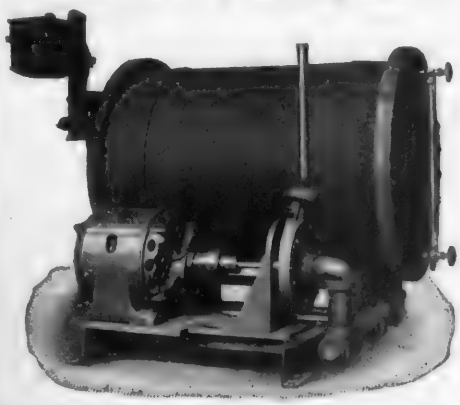
Central Station Heating Notes.

Anderson, Ind.—The deal for the purchase of the Central Heating Company's plant and property in Anderson has been approved by the Public Service Commission of Indiana. The new owners are B. W. Bissell & Co., a co-partnership consisting of A. J. Stahl, of La Porte, Ind., B. W. Bissell, of Indianapolis; and George H. Alexander, of Logansport. The new company assumes $63,000 of debts and obligations of the Central Heating Company. Announcement has been made that $20,000 will be expended in improving the plant. Mr. Bissell will make his headquarters in Anderson and will manage the plant.

Bloomington, Ind.—The Central Indiana Lighting Co., of Bloomington has petitioned the public utility commission for an increase in its hot water heating rates. The old rate is 15 cents per square foot of radiation, and last winter the company was allowed a surcharge of 7 cents per square foot. In the new petition it asks for 30 cents per square foot, and to cut off about 40 consumers at the end of mains where it is difficult to give good service.

WAR-TIME ECONOMY

demands the use of fuel-saving devices



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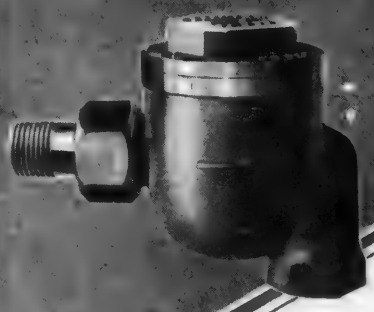

Keep a dozen Johns-Manville Radiator Traps right in the bin—in the store-room—where your job-runners can pick them up quick on call. It's a good way to teach your men the economy and advantages of the trap and it's an easy way to assure yourself your rightful profit on the next big job that comes along.

For while it's easy to figure the number of traps you'll need and the time to attach them, it's another matter to guess the time it may take to make adjustments.

And it's the cost of that time that eats up your profit on the job. Simplicity of construction makes adjustments in the Johns-Manville Radiator Trap unnecessary. For there are but three parts—the body, connecting union and ball.

We will be glad to send our bulletin with its suggestions to you if you'll ask it.

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Sioux City, Ia.—A proposed ordinance is being considered by the city council raising the steam heat rates of the traction company. It is estimated that the increase would amount to an average of 50%.

Chicago, Ill.—Citizens of Oak Park and Forest Park have organized to oppose the measures taken by the Public Utilities Company of Northern Illinois in connection with the increase in its hot water heating rates. Some time ago the company was given permission to raise its rates 20%. It is now claimed that the company, without the knowledge of the consumers, put through an accompanying aplication to change the basis of its heat measuring standard so that the customers' charges run from 50% to 200% above the former charges.

Luverne, Minn.—The City Heating Company, after paying 7% interest to its stockholders, has cancelled $3,384 of the original stock issue, as a result of its first year's business. Under the agreement entered into for the installation of the plant, the stockholders or heat users provided the funds for the building of the plant, and steam is furnished from the municipal light and power plant, the city collecting from each stockholder for the amount of steam used in his building. After the payment of the 7% interest, the remaining funds each year are to be used to cancel outstanding stock.

Monmouth, Ill.—Patrons of the Monmouth Public Service Company using steam heat have been notified by the company that the company has elected to "exercise its right to terminate its contracts" and those using steam heat were advised to install individual heating plants. The consent of the Public Utilities Commission is necessary before the company can make this action effective. A recent petition of the company to increase its rates was denied by the commission.

Springfield, Ill.—The Illinois Public Utilities Commission is conducting hearings on the application of the Central Illinois Public Service Company to discontinue heating service in Moweaqua and in Carrollton.

Belvidere, Ill.—The question of continuing the heating service of the Illinois Northern Company is before the State Public Utilities Commission. At one of

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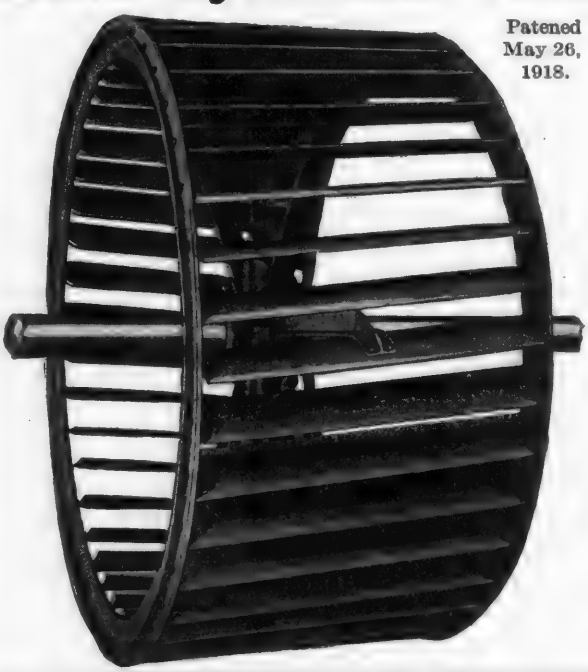

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For Heating and Ventilating

The vanes are curved forward, and set at an angle to the shaft, (patented feature) allowing uniform, unrestricted flow of air across entire width of wheel.

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Speeds Up Production

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The view above shows an installation in a factory noted for its production and efficiency methods.

In the "dog days" of summer the Sirocco System is invaluable in keeping the factory workers fresh and fit by supplying the proper amount of fresh, pure air to every nook and corner.

Let us tell you more about Sirocco for your factory—Ask for Bulletin No. 270.

American Blower Company

DETROIT, MICHIGAN

BRANCHES IN ALL PRINCIPAL CITIES

the hearings expert testimony was given that the plant could be put in a reasonable state of repair at an expenditure of $2,000 or $3,000. Other engineers have expressed the opinion that the plant would have to be rebuilt, at a cost of from $125,000 to $150,000. If that were done it would be necessary to maintain a heating rate of at least 32 cents per square foot. The present rate is 12 cents, which, it has been shown, is not sufficient to enable the company to return a profit.

Alton, Ill.—Users of the hot water heating service of the Alton Gas & Electric Company have filed a petition asking for a rehearing on the petition and application of the company to discontinue its heating service which was recently granted by the commission. In its first petition a year ago the heating company was refused permission to quit and was ordered to repair and continue service. It was allowed to raise the rates nearly 50%. A rehearing was granted, resulting in the company receiving permission to dismantle its plant at the close of the season ending May 31 last.

Public Utilities Co., Evansville, Ind., has appointed Charles Williams, member of the firm of Reeves & Baillie, architects, of Peoria, as superintendent of its heating department.

Kitchener, Ont.—At a protest meeting held by patrons of the Consumers' Steam Heating Company, on account of interruptions of service due to the coal shortage, the owners of the plant, who were present, decided to offer the use of the plant and system, rent free, to the consumers, for the balance of the heating season. The proposition was accepted by the consumers and an association was formed to carry on the business.

Central Station Steam Co., Detroit, Mich., has received an order for 300 condensation meters from the Springfield Gas & Electric Company, Springfield, Ill., whose customers will be put on a meter basis in accordance with a ruling of the Illinois Public Utilities Commission. Some of the customers were already on a meter basis and the final decision of the commission puts them all on the same basis.

"AUTOVENT"
Motor Driven Propeller Fans

The very latest ideas on improved propeller fan construction are embodied in the wonderful mechanical perfection of these fans. The motors are of the protected type, provision being made for easy accessibility and inspection of working parts within motor by removal of end hood cover. The motor windings are protected against dirt, grease, acids, or other foreign substances from entering therein.

Patent Rotor-Centering bronze bearings are used on all multi-phase fan motors 36" size and above, the rotor and shaft can be re-centered by one-half turn of outer bushing without removing the motor end hood; also shafts have exceptionally large diameters.

All sizes carried in stock for quick shipments

Easiest to Install **Neatest in Appearance** **Quietness of Operation**

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AND DO IT SO THOROUGHLY AND EFFECTIVELY THAT
EVER AFTER THE WORLD WILL BE

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BUY BONDS—AND WAR SAVINGS STAMPS
HELP THE RED CROSS AND THE Y. M. C. A.
PAY YOUR TAXES WITHOUT COMPLAINT
FILL THE WAR CHEST SAVE AND SERVE

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INVESTIGATE NOW THE ADVANTAGES OF

Air Conditioning

BE READY FOR THE COMPETITION INVOLVING

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BRAEMER AIR CONDITIONING CORPORATION
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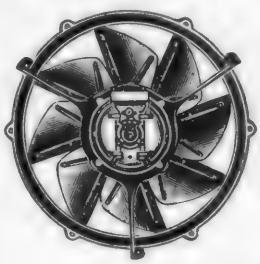
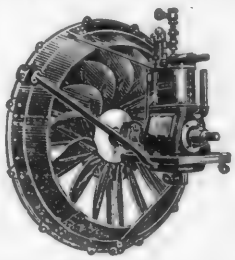
NEWARK - NEW JERSEY - U. S. A.

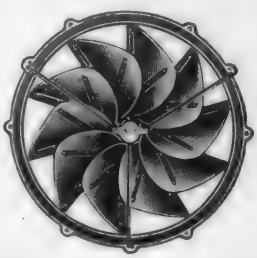
ELECTRIC DRIVEN



STEAM DRIVEN



BELT DRIVEN



Send for Bulletin No. 121, Jan. 1917

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Ventilating systems to suit all conditions. **Dust Collectors, Humidifiers, Dry-Rooms** to dry anything from bricks to sponges.

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JAMES M. SEYMOUR, 5-7-9-11-15-17-19 Kirk Place, NEWARK, N. J.

Carrier Equipped

buildings for **Public—Industrial**—and **Office** use are

COOL IN SUMMER
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and have an abundant supply of pure, fresh air all the time.

Other systems may be cheaper—other guarantees may be higher—but **results** are what count. And to be sure of getting the **best results** specify

CARRIER

There is no equal

Shall we send our engineer —or catalog 13-36?

Both are waiting to tell you WHY.

CARRIER AIR CONDITIONING COMPANY OF AMERICA
Buffalo, N. Y.

New York Boston
Chicago Philadelphia

Manufacturers' Notes.

Wheeler Condenser & Engineering Co., Carteret, N. J., has, under agreement with the Sugar Apparatus Mfg. Co., acquired the exclusive right to manufacture and sell evaporating apparatus under the patents of S. Morris Lillie, president of that company.

Advance Waterproof Cement Co., Chicago, Ill., announces that Robert Seth Lindstrom, architect, has given up his profession after being identified with the same for 30 years, to join the activities of the cement industry as general manager of the Advance Waterproof Cement Co. Mr. Lindstrom will be in charge of a "service" for architects, engineers and contractors, pertaining to waterproofing, concrete, mortar, stucco and cement products by the use of regrinding and treating standard Portland cements.

Clarage Fan Co., Kalamazoo, Mich., announces that B. E. LaFollette, who has had charge of the engineering, sales and advertising departments for the Clarage Fan Company, has resigned to go into Government service. Mr. LaFollette will be located in either Philadelphia or Washington as an engineer with the Requirements Division of the United States Shipping Board.

Industrial Organization by Districts.

The War Trade Board has adopted as a general standard a form of industrial organization which has already been carried out in the Cleveland district. It is now being considered, with some modifications to suit local conditions, for adoption in the New York district.

According to the War Trade Board's plan, the country is divided into regions,

Air Conditioning

never involves too complex a problem if you avail yourself of our advice

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Engineering Corporation
39 Cortlandt St., New York
Boston Philadelphia Buffalo Chicago

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Motors and Control

Postal Life Building's Compact Fan Installation

Westinghouse Ventilating Equipment

This installation of a 20 horsepower Westinghouse Motor mounted between and directly connected to, two Sturtevant Fans, is a very compact and successful job.

One fan supplies fresh air to the first two floors of the building. The other fan exhausts. This is but another successful installation of Westinghouse Motors and Control driving ventilating equipment. You will find them in all parts of the country in public buildings, schools, clubs and theatres.

Our engineers will cooperate with you. Write for booklet 7193.

Westinghouse Electric & Manufacturing Co.

East Pittsburgh, Pa.

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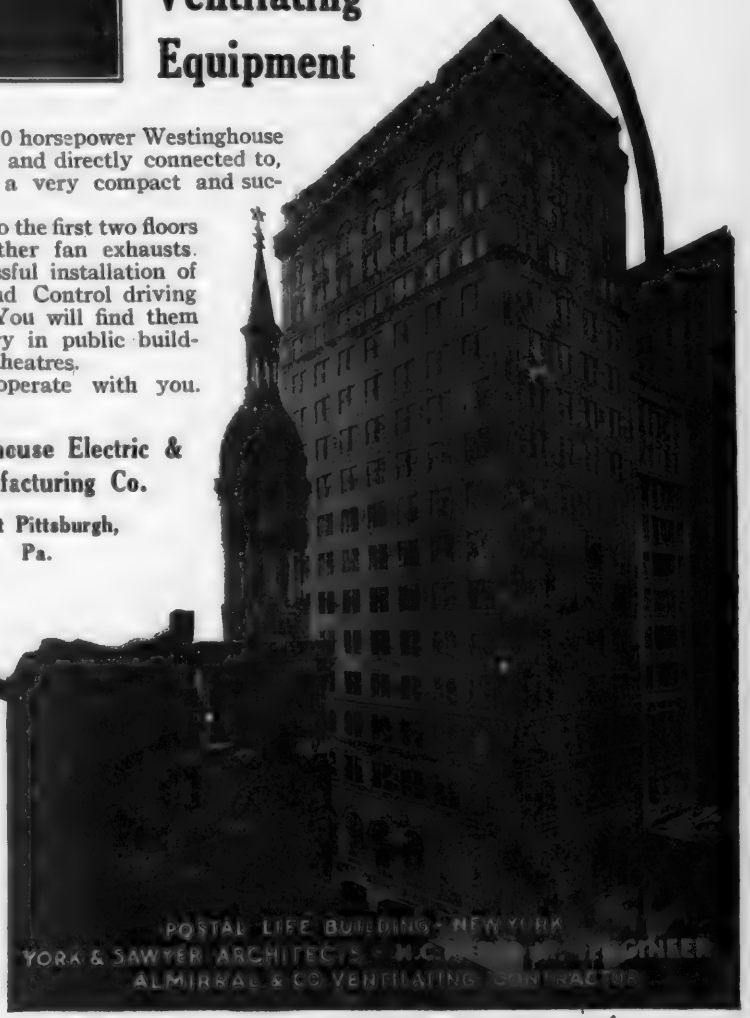

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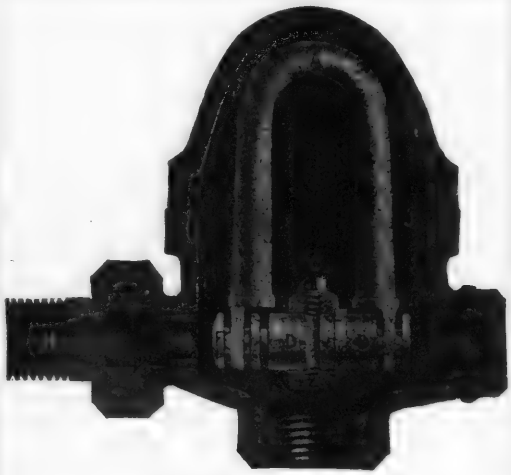
WESTINGHOUSE ELECTRIC



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Recommended for use with cast iron radiation with low pressure steam.
Not exceeding 10 lbs.

Built Right in the First Place

¶ That's why it has not been necessary to change the principle of this thermostatic tube a particle during more than 18 years it has been in use.

All HAINES Automatic VALVES and TRAPS

are guaranteed absolutely for a period of five years, when used on vacuum or low pressure heating systems.

Send for latest Catalogue

WM. S. HAINES & CO.

PHILADELPHIA, PA.

each of which is to be organized under the leadership and with the co-operation of local commercial bodies. There are 20 of these regions.

The general plan of organization provides for the formation, through commercial bodies, of industrial committees with headquarters in the principal industrial center of each district, and such subdivisions as are recommended by the business associations of each district.

When the divisions and sub-divisions have been established, a survey of the industries will be made and recorded at the headquarters of the section in Washington, where the information will be available for the various purchasing sections of the Government.

In each sub-region a chairman, prominent in his line of industry, is placed in charge of each classification. These chairmen form the executive committee in each sub-region and constitute the governing body within the sub-region. They are represented in the executive committee of the region by their chairman.

Lists of questions applicable to each classification are to be sent to every factory. These questions are of necessity different in form. These lists will be in triplicate, one copy being kept by the

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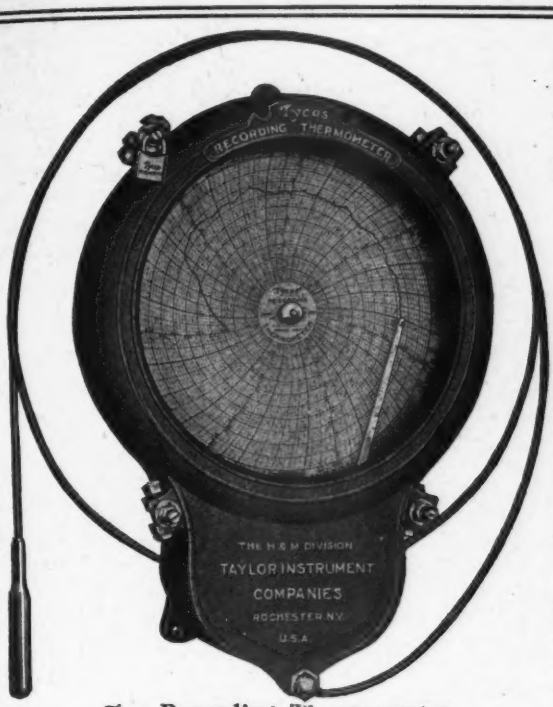

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Tycos Temperature Instruments

Indicating - Recording - Controlling

Your Reliance in Heat Control

They help you attain positive temperature control. Their wide use in innumerable industries prove that they accomplish definitely accurate results.

Applicable to the most stringent demands.

Write us concerning the particular industrial purpose for which you wish to employ *Tycos* Instruments. The services of an expert staff, our literature and catalogues are at your disposal. A post card request will secure you this valuable aid without charge or obligation.

STANDARD THERMOMETERS --- INDICATING AND RECORDING

for VACUUM, STEAM and HOT WATER SYSTEMS, BAKE OVENS and COLD STORAGE PLANTS. SEVEN models of RECORDING and EIGHT of INDICATING Thermometers.

All Accurate, Durable and Legible. Backed by 30 years of Thermometer Manufacturing.

They are practically indestructible, are sensitive to changing temperatures and are very easily installed. Supplied with horizontal or vertical extension and standard pipe thread.

Ask for Catalog No. 100-107 and Trade Prices.

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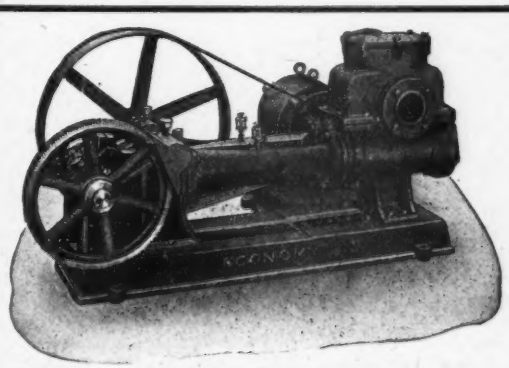

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Economy Return Line Vacuum Pumps

Electric or Power Driven High Class Bronze Fitted

PRICE CAN'T BE BEAT

Quantity production in specialized lines enables us to make prices that others making a large variety of apparatus cannot meet.

Keep in Step with the Times Be a Specialist

Buy your Return or Air Line Vacuum Pumps, Condensation or Hot Water Circulating Pumps from Manufacturers who specialize in pumps for the Heating Trade.

Don't fail to write for "ECONOMY MANUAL A." Most complete vest pocket Heating, Ventilating Engineer's Hand Book. This $1.00 publication mailed free on request.

ECONOMY PUMPING MACHINERY CO.
116-118 N. Carpenter St., Chicago, Ill.

executive committee of the sub-region, one by the chairman of the classification and one by the sub-chairman of the sub-classification. This plan distributes the knowledge contained in the replies to everyone to whom it is of interest.

In the Cleveland region it is now possible, through the sub-region organizations, to place the Government inquiries for raw material in the hands of men who are thoroughly familiar with local conditions and thus to get prompt reports concerning available capacity. The combined reports from the War Industries Commission in the sub-regions give the capacity of the region.

Under the plan followed by the Resources and Conversion Section of the War Industries Board, inquiries will flow from the War Industries Board to the regions, where detailed information will be obtained by means of the regional organizations. This information will then be given to the supply and purchasing offices of the Government.

The physical equipment of a shop is not as important as the personal element. In the Cleveland region the manufacturers are developing new initiatives and placing themselves industrially in closer contact. Manufacturers are learning that many products of which they were uninformed are being made in their vicinity. It is expected that benefits will come through regional organization after the close of the war and that these organized districts, working together, cannot help being of benefit to the entire industrial and financial structure of the country.

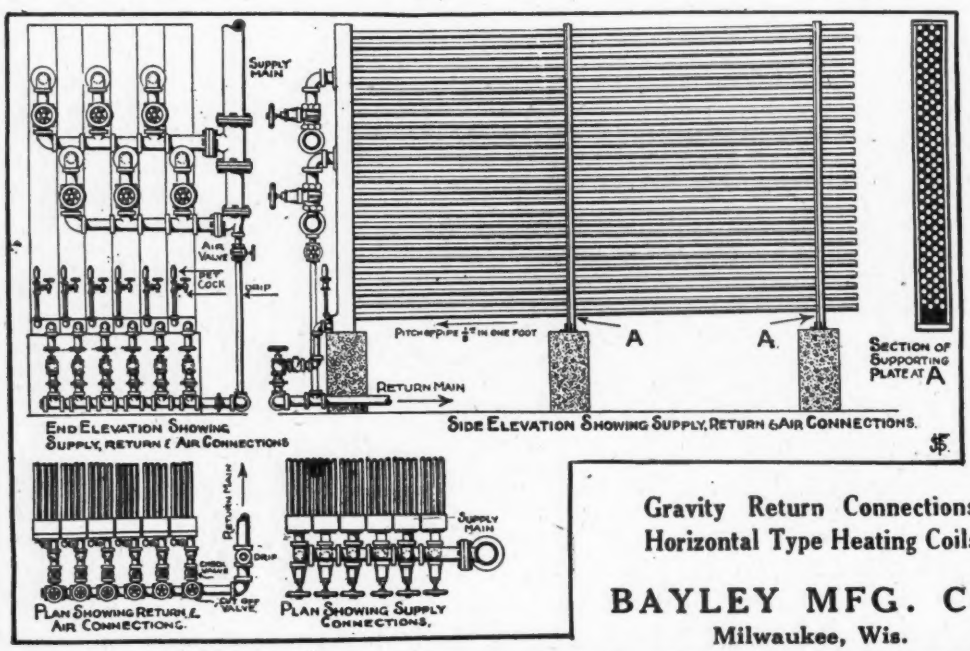
Brick Work on High-Pressure Boilers Limited in Chicago to Licensed Brick Masons.

Word has been received that the Chicago City Council has just passed an ordinance making it unlawful for anyone but a licensed brick mason to do any brick work or to repair any brick work on any high-pressure boiler in the City of Chicago. This ordinance makes it impossible for the boiler manufacturers to tell their patrons that the brick work can be installed by any handy man, instead of by experienced masons.

Commenting on the new ordinance it is pointed out by one boiler manufacturer that, as a rule, brick masons are the last people who know how to lay up a boiler furnace lining. It is apparent that the

CHINOOK HEATERS

Give Positive Circulation No Unequal Expansion and Contraction. Highly Efficient



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Horizontal Type Heating Coils

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Johnson { Heat / Humidity } Control

Always the Leader in Inventions and Improvements

First: Practical Heat Regulation.

Second: Pneumatic Thermostats.

Third: Humidostats—the first practical apparatus for the control of humidity.

Fourth: The "SYLPHON" Metal Diaphragm Valve for heat control, the one thing needed to make heat regulating systems durable and reliable. We tested this valve three years before we offered it for use. Untested imitations and substitutes followed fast, but having been thoroughly tested and proven equal to all demands.

the "SYLPHON" is the Recognized Standard.

Fifth: Unequalled Service in all Departments.

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Offices in all Large Cities

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PATTERSON HOT WATER TANK

for heating water for domestic or manufacturing purposes. Both ends of each seamless brass tube are expanded into heavy cast-iron tube-heads with an improved roller expander. Their shape provides for the free contraction and expansion of each individual tube without straining, so there is no danger of leakage.

Type C. Patented Aug. 26, 1913.

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Send for Catalogue.

PATTERSON - KELLEY CO., 23 Dye Street, New York

Representatives in all Principal Cities.

Inefficient Heating Systems in Old Buildings can be Remodeled at Comparatively Small Cost into Efficient WEBSTER Systems

NOW is the time to act in order to derive the full benefit and economy for adequately heating every portion of many types of buildings next winter, without carrying several pounds back pressure on the engines or requiring an undue amount of live steam.

From present indications, there will be a great scarcity of coal during the coming cold months. Prepare NOW to overcome this by installing the WEBSTER System.

At comparatively small cost and without extensive alterations or seriously impairing the operation of any department—the unsatisfactory heating system can be changed over in a short time into the

"The Webster"

Vacuum System of Steam Heating

Over 11,000 successful installations in all classes of buildings have been made during the past 30 years. A large part of these were changed over from old heating systems. A return of from 25 to 50 per cent has often been realized on the investment required for changing over a poorly designed heating system into the highly efficient WEBSTER System.

The WEBSTER Vacuum System of Steam Heating provides the perfect circulation of exhaust steam or live steam or a combination of the two through every radiator or pipe coil without appreciable back pressure on the engine, or noise, odor, air binding and other objectionable features.

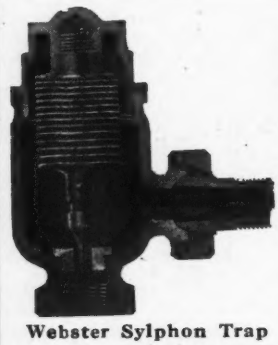
We co-operate with the architect, consulting engineer, heating contractor or owner to help secure the best and most economical results at the least possible cost.

The Webster Guarantee is the Owner's Insurance Policy

Write TODAY for a copy of our Catalog V-37

Heating the Manufacturing Plant by the Webster System

WARREN WEBSTER & COMPANY



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MAIN OFFICE AND WORKS

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Branch Offices in 30 Cities

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bureau charged with the enforcement of the ordinance should at least differentiate between the setting proper and the lining.

It is felt that ordinances like this one are made in the interests of trade unions, and if the ordinance cannot be repealed, it is urged that manufacturers should at least emphasize the point that the habits, customs and training of brick masons in laying brick entirely unfit them to lay fire brick and that this work should be done by expert brick masons and by expert boiler-room men.

Walter E. Bush, 109 Highland Ave., Jersey City, N. J., has recently been appointed United States buyer for one of the largest importing corporations in Australia.

Fourteen 600-H. P. Machines

One Shipment

Draining heated apparatus and feeding the condensate directly into boilers at temperatures over 300° in some instances

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